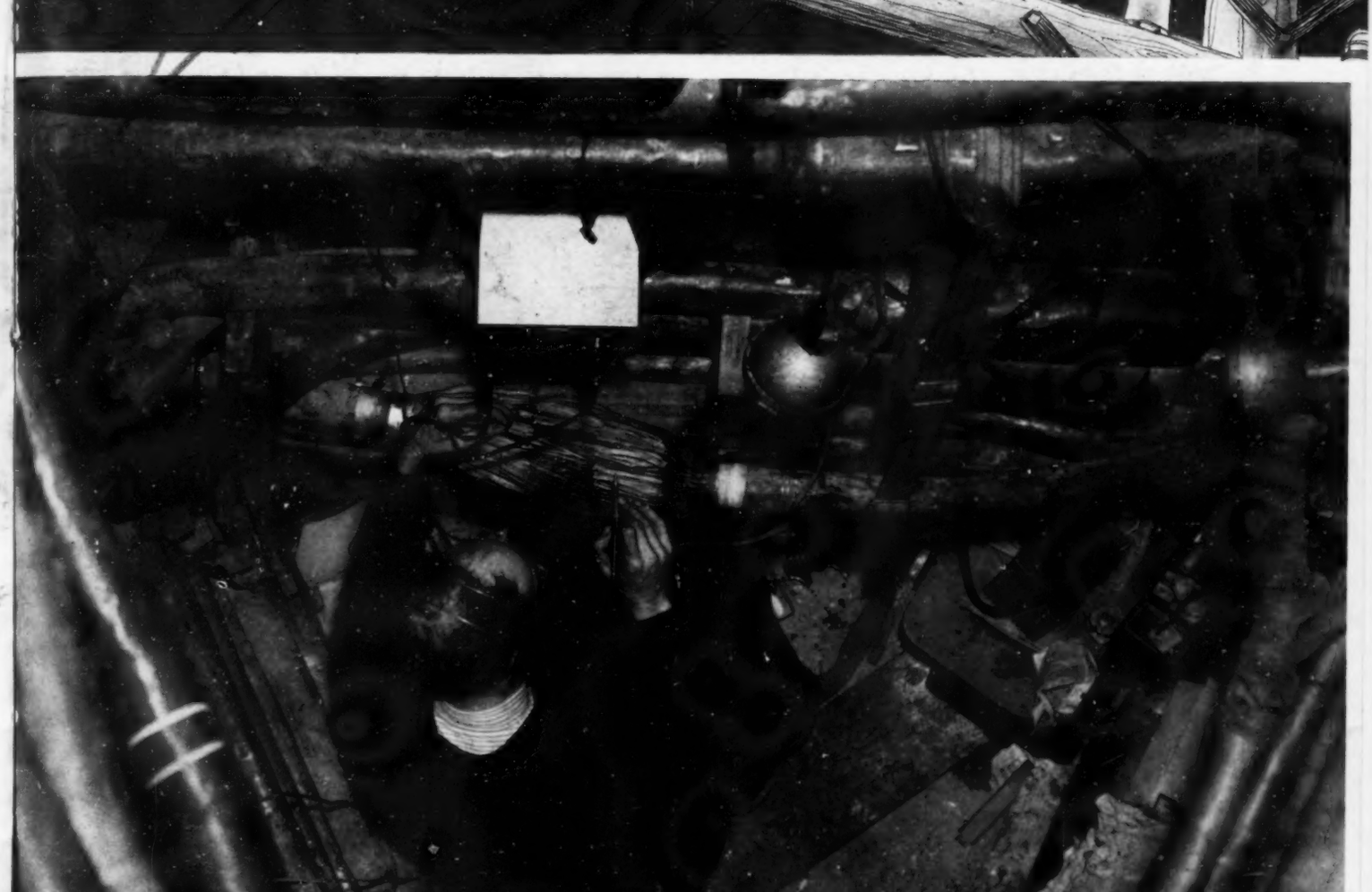
TELEPHONE ENGINEER and MANAGEMENT



Erie, Pennsylvania

On August 12, 1813, the American fleet under the command of a young Navy lieutenant named Oliver Hazard Perry, set sail from Erie to engage the British fleet. Three of these ships, the Lawrence, Ariel and Niagara, were built at Erie out of timbers cut from the nearby forest.

Early in the morning of September 10 the two fleets met in the famous Battle of Lake Erie. As the battle raged, the Lawrence, Perry's flagship bore the brunt of the fighting, the Niagara being kept in the rear. The Lawrence suffered terribly under the concentrated fire of the enemy. All her guns were dismantled, her masts broken, her rigging rent away, and her sails torn to shreds. At the start of the battle her crew numbered 103 officers and men. Now only Perry and 13 others were left uninjured. The decks were thick with blood and strewn with the dead and dying. Defeat stared Perry in the face when suddenly he hauled down his battle flag, called four sailors to man a boat, and with the flag wrapped around his arm, he stepped into the boat, stood upright, and ordered the men to pull for the Niagara. After a hard pull of 15 minutes, they reached the Niagara. Perry sprang on board, hauled up the flag and speeded his fleet into action. This brave feat changed the day. The battle flag bearing Lawrence's dying words "Don't Give Up the Ship" flew from the Niagara's mast. Soon victory rested with Perry's fleet, and for the first time in the history of Great Britain, an entire squadron surrendered — and to a young man of 27. On the deck of the Niagara, Perry, using his naval cap as a desk on which to rest the back of an old letter, wrote with a lead pencil the immortal message, "We have met the enemy and they are ours." This victory confirmed and established for all time American independence.

ERIE — rich in historical heritage and rich in modern industrial development.

Erie leads the world in the production of boilers, engines, wringers, gas meters, gasoline pumps, electrical locomotives, steam hammers, power equipment and appliances, hospital and sterilizing equipment. It ranks third in the Country in the diversity of its manufactured products.

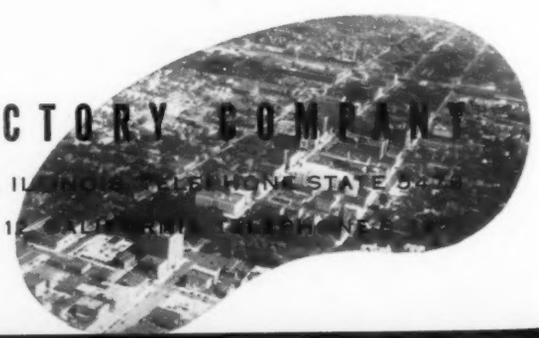
Two of the leading industries here are the General Electric Plant and the Hammermill Paper Company.

This City is the focal point of industry for many miles around for in addition to being Pennsylvania's only Great Lakes port, Erie is served by four major railway systems.

The Pennsylvania Telephone Corporation which provides telephone service for this area employs the complete directory publishing services of our organization.

In Erie, as in the other more than 1000 cities and towns for which we publish directories, it has been relatively easy during the past few years to show continuing increases in gross advertising revenue from directory operations. While of course this is one of our objectives we place our emphasis upon the production of accurate and attractive directories. We know this type of directory is of inestimable value in helping the Telephone Companies which we serve maintain satisfactory relations with their subscribers.

If you are not completely satisfied with your present directory publishing procedure, we would welcome an opportunity to discuss the benefits of our complete services.



GENERAL TELEPHONE DIRECTORY COMPANY

EASTERN OFFICE: 185 NORTH WABASH AVENUE, CHICAGO 1, ILLINOIS, TELEPHONE STATE 2-[illegible]

WESTERN OFFICE: PRESS-TELEGRAM BUILDING, LONG BEACH 1[illegible] CALIFORNIA, TELEPHONE [illegible]

On September 29, 1927, President Coolidge, in Washington, and President Calles, in Mexico City, inaugurated long distance telephone service by land lines between this country and our friendly neighbor to the south. It was an important event, for it established closer social and business relations between the two countries . . . to the advantage of both.

Throughout the United States, the "twenties" were years of great telephone expansion. During the last six years, and especially 1947, the greatest expansion of all time has been under way. The telephone *Spirit of Service* grows stronger with the years . . . maintaining the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exide Batteries have been proving themselves worthy of that trust.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

IT SEEMS TO US

R. A. (DICK) LUMPKIN, president of the USITA, has several hobbies that keep him busy. Airline flying is one that fits into his business as head of the Illinois Consolidated Telephone Company and as the much travelled chieftain of the national association. Dick is also an authority on saddle horses and his stables at Mattoon, Ill. are known throughout the country. Get him to tell you the story of his Tennessee walking horse!

• • •

R. B. STILL, president and gen. mgr. of the Illinois Telephone Co. with headquarters at Bloomington, played host to a number of Independent telephone men the early evening of August 30 just before the cutover of the Bloomington exchange to full automatic switching. With Mrs. Still, he barbecued chicken for about 30 guests. We hope we qualified for a copy of the recipe of the barbecue sauce.

• • •

ROY W. SIEMUND and his Pioneer Banquet Committee are all set for the convention banquet to be given October 15th during the USITA convention. All preliminaries will be completed by the time you read this. The Committee consists of: MR. SIEMUND, chairman; RAY W. SMITH, sec.-treas.; JAMES PFAENDER; W. H. WALTER; JAMES H. KELLOGG; CHESTER RUTH; RICHARD FAULHABER; R. C. RENO; HERBERT LELLO and JOHN B. COOK. Tickets will be available at the registration booths and table reservations will be made on first come, first served basis. (And may the best man win!)

• • •

The article "50 Years of Independent Telephony" that appears in this issue is one that will be interesting reading to the young and old of the industry. To the author E. C. BLOMEYER, its preparation was a labor of love as the USITA requested that he prepare a manuscript for the association on its 50th anniversary. We believe you will agree it is an outstanding bit of writing after you have finished reading it.

The National Telephone Magazine

VOL. 51 No. 9

TELEPHONE ENGINEER and MANAGEMENT

SINCE 1909

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SEPTEMBER, 1947

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★

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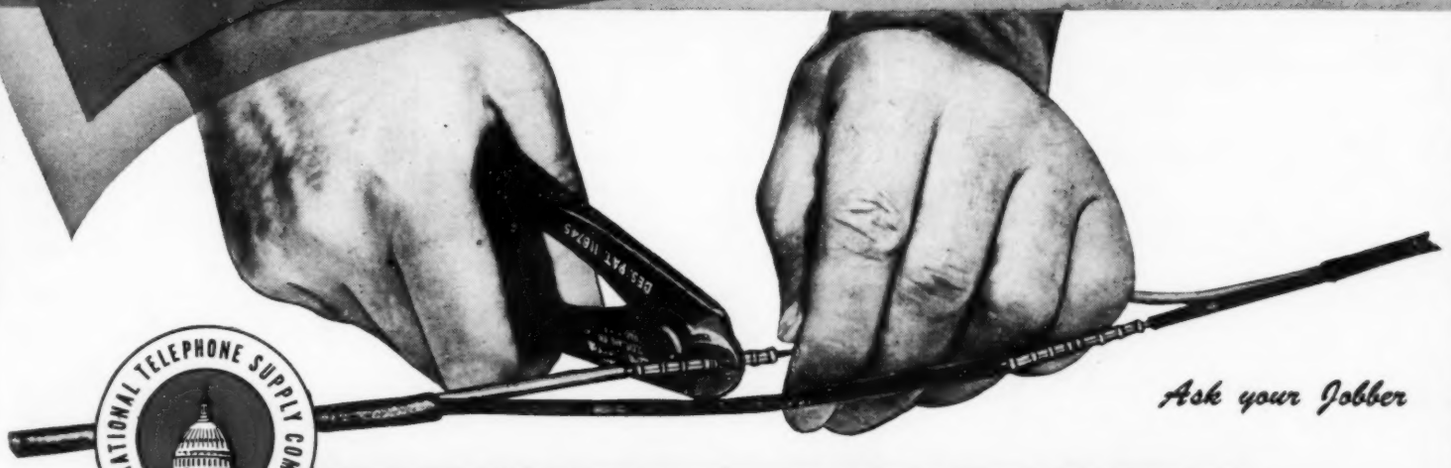
THIS *Nicopress* SLEEVE

plus

THIS *Nicopress* 17-2 TOOL

Make better pair splices faster than you've ever made them before!



THE NATIONAL TELEPHONE SUPPLY COMPANY

Ask your Jobber

The National Telephone Supply Company

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Export Distributor — INTERNATIONAL STANDARD ELECTRIC CORP., NEW YORK, N. Y.

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on its 50th Anniversary.
Plan Now To Attend Our
★Exhibit at the Convention.
See our 'Through the Years'
Exhibit. We Will Gladly
Discuss Any Directory
Problems You Have.—
L. M. BERRY & CO.
Main Office: Telephone Building, Dayton, Ohio
ESTABLISHED ——— 1910
★Room 557-A—Stevens Hotel—Chicago, Illinois

NEWSLETTER
TELEPHONE ENGINEER

Fortnightly TELEPHONE ENGINEER ★ TELEPHONE ENGINEER AND *Management*

ON THE 1st OF EACH MONTH ON THE 15th OF EACH MONTH

NEWSLETTERS *on Alternate Weeks*

September 15, 1947

Dear Sir:

Independent & Bell telephone companies read of - but did not like - Joseph A. Beirne's (pres. of Communications Workers of America) comment to Sen. Taft that public utilities represent non-competitive interests and thus rates of interest should be the 2½% paid by U. S. government rather than 6% and higher rates. Telephone leaders fired back that telephone business is not non-competitive; is not riskless; that dollars in hands of investors and corporations are creators of more industrial prosperity than money in hands of workers. Beirne's statement ties in with union opposition to rate increases; - Makes our reference to Aesop Fable on "Goose That Laid Golden Egg" in last issue deserve repeating.

* * *

All sales commodity prices continued to rise through August. It is generally conceded that price of meat and other animal products will go still higher as result of shortage of corn and some other grain crops. Price of coal and steel are up again. Wage adjustments continue in many industries, always resulting in higher pay which in turn results in still higher price of both raw materials and manufactured products.

Under such conditions price of telephone service, even where telephone rates have been raised, becomes cheaper every day in comparison with present day costs of other things. Any telephone company that is trying to get by under present and prospective conditions on exchange rates fixed years ago, is simply fooling itself. It has no chance of whipping all by itself, an economic situation that is beyond the control of the whole nation. Regulatory commissions know this. They are receptive to rate increases of telephone companies. But they do not initiate rate increases themselves.

Many exchange rates now in effect were made 10, 15, even 20 or more years ago. They are now so far out of line with present prices and costs that they are ludicrous. The survival of many Independent telephone companies -- particularly small companies -- depends upon an adjustment of their exchange rates to meet present conditions and costs.

* * *

Indiana Tel. Assoc'n. following program other state groups could emulate. Indiana group is putting, and has put, emphasis on education, and lending helping hand to companies interested in better construction, improved service, extended operation. Group recently held Toll Center Chief Operator meetings at Rochester and Muscatuck Park; plan 7 more for September and October. Association made tentative plans for 15 educational plant construction and maintenance meetings to be held this fall. Each meeting will involve full day program; deal with rudiments of plant construction and maintenance. Dates and locations to be announced later. Such programs deserve commendation. Indiana association leaders realize that smallest, most isolated locally-owned telephone exchange must keep pace and needs help to do today's job.

Coming USITA Convention notes: Last call for hotel reservations at Hotel Stevens, convention headquarters, for coming national United States Independent Telephone Association Convention. Hotel notifies us only limited number of rooms unassigned. Most reservations read Oct. 13 or before as that is date of Bell Telephone Hour appearance in Chicago honoring USITA 50th Golden Jubilee. Tickets available to all Independents. Entire 5th floor of Hotel will be devoted to exhibitors bringing back feature eliminated during war. Our October 1 Fortnightly TELEPHONE ENGINEER will bring you official program in our Special Salute to 50th Anniversary of USITA.

* * *

Resale of telephone service - one subject that has been issue of many court wrangles - received possible death blow in recent Missouri Commission ruling. Case involved S. W. Bell subscriber who furnished telephone service through his office P.B.X. to tenants; billing tenants flat charge per month. Commission considered transaction as resale of telephone service by party not subject to commission jurisdiction and in violation of company rules restricting use of customer service to customer, family, employees or business associates. Without such rules, third party is established between company users of its service. Commission stated such resale of service would break down regulation; if permitted there would be no limits to such resales.

* * *

Construction, expansion and improvement program of Independent companies moving at increased pace. In past few weeks, newspapers all over U. S. reported approx. 108 improvement programs involving Independent companies. We report as many as possible in this issue. In News Briefs (page 27) total amount of programs reported total approx. $3,500,000; many hundreds of thousands of dollars for improvement are reported in other columns. Such reports verify our oft reported assertion that Independents are keeping step with progress, doing their part to keep American Communications best in world.

* * *

Independent's interest in mobile telephone service took step forward with recent Nebraska Commission approval of Lincoln (Neb.) T. & T. Co.'s application to establish mobile telephone rates and service. Lincoln company plans three classes of service from Lincoln exchange; - general service between any telephone and a mobile unit and between two units, dispatching service, and signalling service. Lincoln company has pioneered in mobile service experiments; its introduction of mobile telephone service in Lincoln area is well in line with fast mobile telephone growth. 10,000 calls a week are now being made in 60 U. S. cities.

* * *

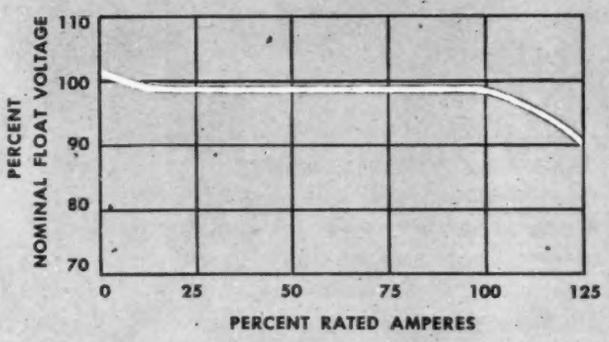
Highlights: Carolina T. & T. Co. to issue 21,250 shares of common stock, par value $100; part of proceeds scheduled for construction program. From Jan. 1, 1941 to June 30, 1947, company made net additions to plant amounting to $4,962,780.....Southeastern Tel. Co. plans automatic conversions for Montezuma and Oglethorpe, Ga....Recent report of Nebraska Tel. Assoc'n. shows class A to E companies operated 302,776 stations as of Jan. 1, 1947.

Ray Smith

Ray W. Smith, Editor

BATTERY-CHARGER FUNDAMENTALS—

how constant voltage decreases relay maintenance



Typical Voltage Regulation Curve of the E. P. Diverter-Pole Motor-Generator

By maintaining the d-c exchange voltage within close limits, E. P. Diverter-Pole Motor-Generators assure stable and low-cost operation of the sensitive exchange relays. The prevention of *low voltage* minimizes weak magnetic coil action; pitting and burning; and disrupted exchange service. Keeping the voltage from rising *too high* helps to prevent coil insulation failures; "slapping" of contacts that may result in misalignment; and preserves the sensitive adjustment of the relays. The E. P. Diverter-Pole maintains inherently constant d-c voltage . . . regardless of fluctuations in the a-c power supply. Delicate, separately-mounted regulating devices are not required.

why EP motor-generators are best . . .

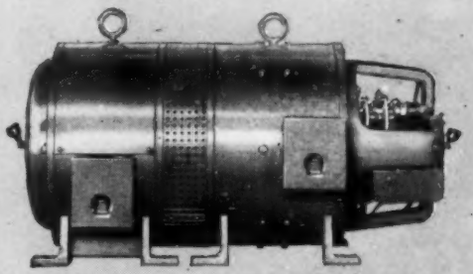
Since 1923, Diverter-Pole Motor-Generators have proved to be the most reliable, maintenance-free and efficient source of direct current for Telephone Exchanges. The characteristics of E. P. Diverter-Poles are ideal not only for the most satisfactory floating charge (a full floating charge is now the accepted standard), but also for carrying the major portion of the exchange load better than any other source of direct current.

The main reason for this superiority is that The Electric Products Company is a specialty manufacturer. For every exchange battery-charging application, E. P. designs and builds an individual Motor-Generator that fits exactly the requirements of the particular operation.

The result is Proved Performance as evidenced by the unequalled long-life records established by Diverter-Poles throughout the Telephone Industry.

For complete details . . .

ASK FOR BULLETIN 209



E. P. DIVERTER-POLE BATTERY CHARGERS

- **Are completely automatic**
- **Control exchange voltage well within high-low limits at all times**
- **Lengthen battery life**
- **Are self-protecting against dangerous overloads**
- **Will not "run away" or reverse polarity**

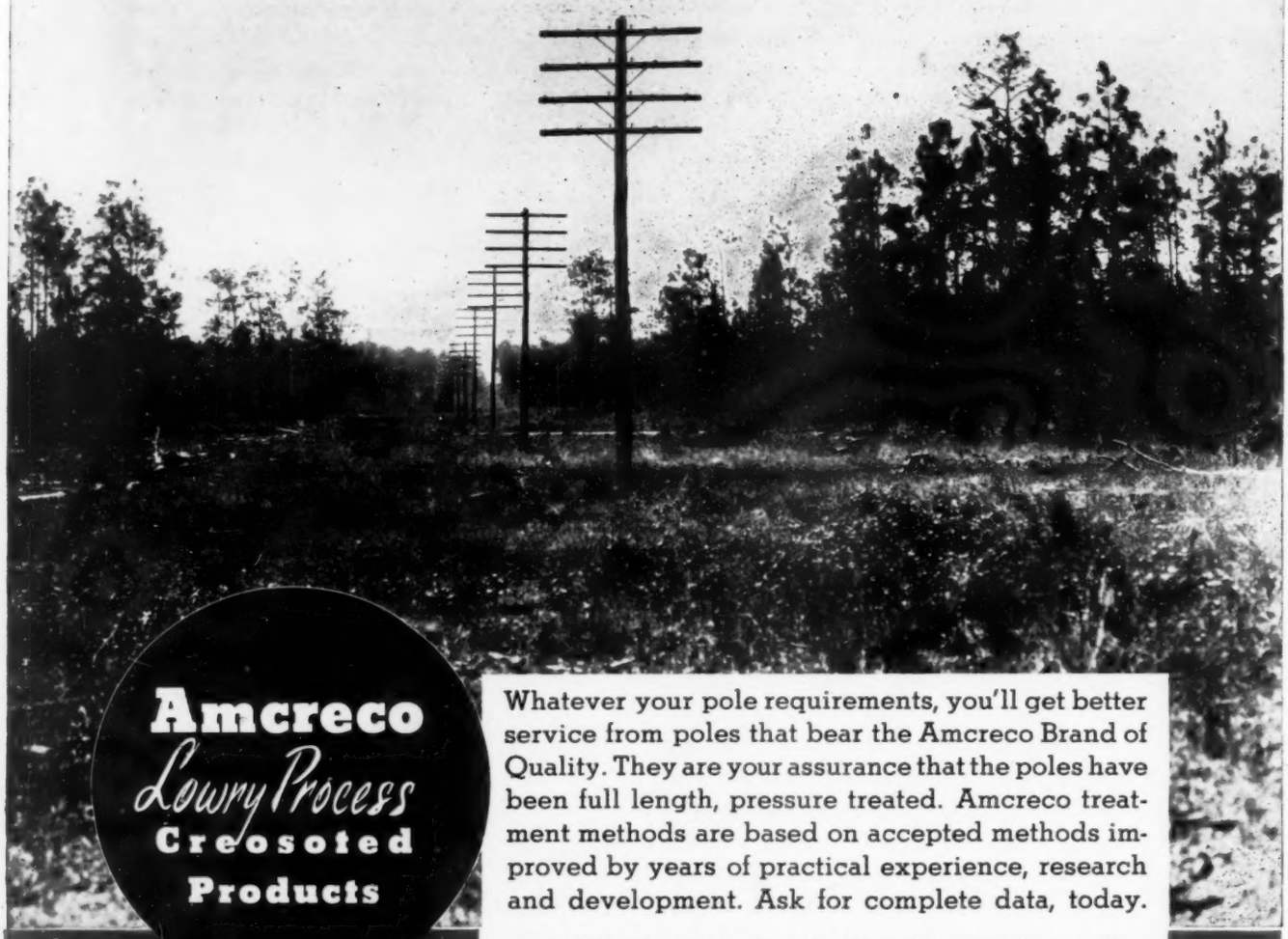
EP X-30

THE ELECTRIC PRODUCTS COMPANY

1729 CLARKSTONE ROAD CLEVELAND 12, OHIO

BE SURE THE *Amcreco Brand* IS ON YOUR POLES

. . . it's your assurance of quality, dependability and long life!



Amcreco *Lowry Process* **Creosoted Products**

- POLES
- CROSS ARMS
- CONDUIT
- PLANKING

Whatever your pole requirements, you'll get better service from poles that bear the Amcreco Brand of Quality. They are your assurance that the poles have been full length, pressure treated. Amcreco treatment methods are based on accepted methods improved by years of practical experience, research and development. Ask for complete data, today.

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AMCREO LOWRY PROCESS CREOSOTED WOOD

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ADDRESS INQUIRIES TO CHICAGO ILL., OR LOUISVILLE, KY.

Pressure treated for strength that lasts!

4 Big Reasons

WHY YOU SHOULD BUY CONSTRUCTION AND MAINTENANCE SUPPLIES FROM STROMBERG-CARLSON

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By concentrating supply purchases with Stromberg-Carlson, you will cut ordering time and effort to a minimum.

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Because Stromberg-Carlson has stock depots located strategically from coast to coast, you are assured of faster, better delivery service.

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Stromberg-Carlson will not sell any item that fails to meet the company's rigid tests for high quality and dependable performance.

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Back of every supply item is not only the manufacturer's warranty, but also the warranty of Stromberg-Carlson—respected by the industry for more than 53 years.

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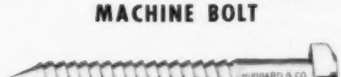
MACHINE BOLT



LAG SCREW

STROMBERG-CARLSON

Recommends:

HEMINGRAY NO. 9 INSULATOR

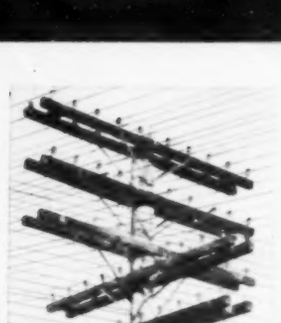
The exchange line pony. Standard on many telephone lines.

HEMINGRAY NO. 42 INSULATOR

Standard for years. Its long leakage path keeps toll lines trouble-free.

HEMINGRAY NO. 12 INSULATOR

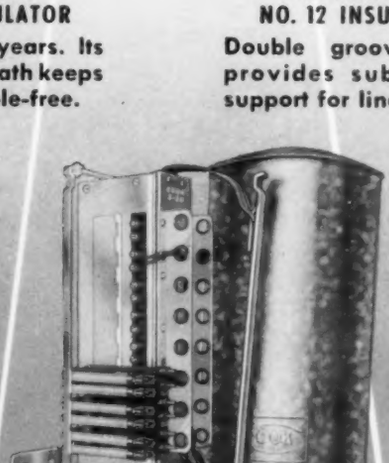
Double groove pony provides substantial support for line wire.



FIR CROSSARMS

COOK TYPE RO OUTDOOR SUB-STATION PROTECTOR

A very rugged Protector, assembled on a bracket of heavy steel to take rough handling and subscriber abuse without danger of breakage.

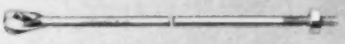


COOK TYPE S-20 POLE CABLE TERMINAL

Offers maximum convenience, performance and economy. Can be used as a protected or unprotected terminal. Made in 6, 11, 16 or 26 pair capacity.

COMPLETE LINE OF CABLE

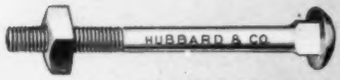
HTE-85 IRON WIRE



HUBEYE ANCHOR RODS

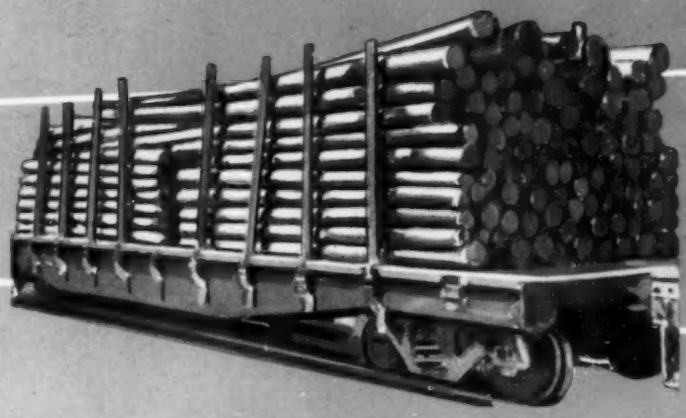
SQUARE WASHERS

HUBEYE BOLTS



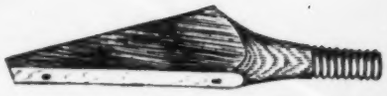
CARRIAGE BOLT

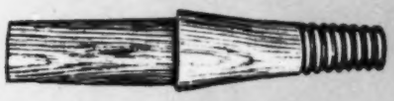
CROSSARM BRACES



PINE POLES

Prepared by the Rueping Process, which literally pumps creosote oil into the wood cells to combat nature's attacks, these pine poles will give long, reliable service.





WESTERN UNION 2"x2⅜"x12" OAK BRACKETS

1¼" x 8" WOOD PINS

NICOPRESS NO. 12 BWG SLEEVES

NICOPRESS NO. 17 B & S SLEEVES

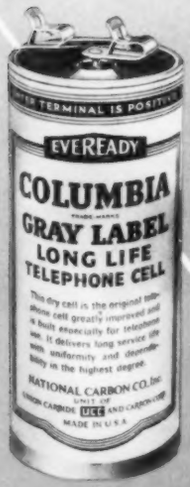
FRICTION TAPE

NICOPRESS NO. 31-DC

Nicopress splices will withstand the toughest strains of vibration and have a high and lasting conductivity.

NICOPRESS NO. 17-2

Convenient and practical to handle in the air or on the ground. Linemen can be sure that the applied pressure will give the exact compression needed.



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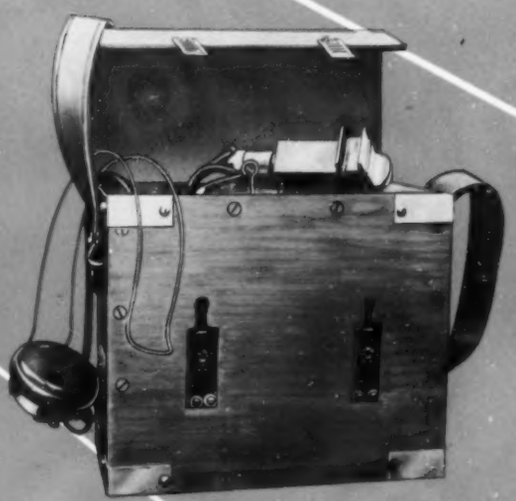
Give higher sustained voltage, longer life. Built by makers of famous "Air Cell" Operators' Transmitter Batteries.

RELIABLE RU POLE CABLE TERMINAL

Simple and rugged in construction, reversible, weatherproof. Capacities 6 to 26 pair.

RELIABLE TYPE 1000-H ARRESTOR

Self-cleaning Discharge Blocks dissipate static. No time lag, no grounding, no carbon deposits. Everdur Binding Posts, bronze fuse clips and carbon springs. Weatherproof cover.



STEWART TEST SETS

Tells which way and how far the trouble is from you without opening the line. Includes a complete telephone circuit for ringing and talking. Trouble is located by means of a detector coil.

Sturgis Metal Chairs with "Firm-Flex" Backs

No. 635 FF
Operator's Chair

AVAILABLE IN MODELS FOR BOTH OPERATORS AND SUPERVISORS

The correct-posture appeal of Sturgis chairs is now further enhanced by an ingenious new development called "firm-flex." The back rest has been made more flexible so that it gives with every body movement yet, *in any* position, firmly supports the operator's back. Seats are fitted, back rest is curved, and both upholstered in hair-filled genuine leather. Brown enamel tubular steel frames are practically indestructible. For further details, contact Stromberg-Carlson, exclusive distributor of Sturgis chairs.

NEW!

No. 648 FF
Supervisor's Chair

EXCLUSIVE WITH STROMBERG-CARLSON

Habirshaw Wire

Both types of Habirshaw Drop Wire, illustrated at the right, are:

1. **High in Dielectric Strength.**
2. **Flame-Resistant—Sheath will not conduct flame.**
3. **Weather-Resistant—No exterior braids to weather and festoon; impervious to the effects of moisture, acids, oils, and factory fumes.**
4. **Mechanically Strong.**
5. **Time-Tested.**

Habirdure General Purpose Wire is small in diameter, has a clean, smooth finish, resists abrasion (no braids to fray), resists oil, acid and alkali, does not oxidize, is flame-proof, and has ridged markers for positive conductor identification. Initial cost is low, and one stock covers inside, jumper or duct use requirements.

NO. 17 BRONZE PARALLEL NEOPRENE SHEATHED DROP WIRE

NO. 17 BRONZE TWISTED PAIR NEOPRENE SHEATHED DROP WIRE

NO. 22 OR NO. 19 TWISTED PAIR HABIRDURE GENERAL PURPOSE WIRE

NO. 22 OR NO. 19 TRIPLEX HABIRDURE GENERAL PURPOSE WIRE

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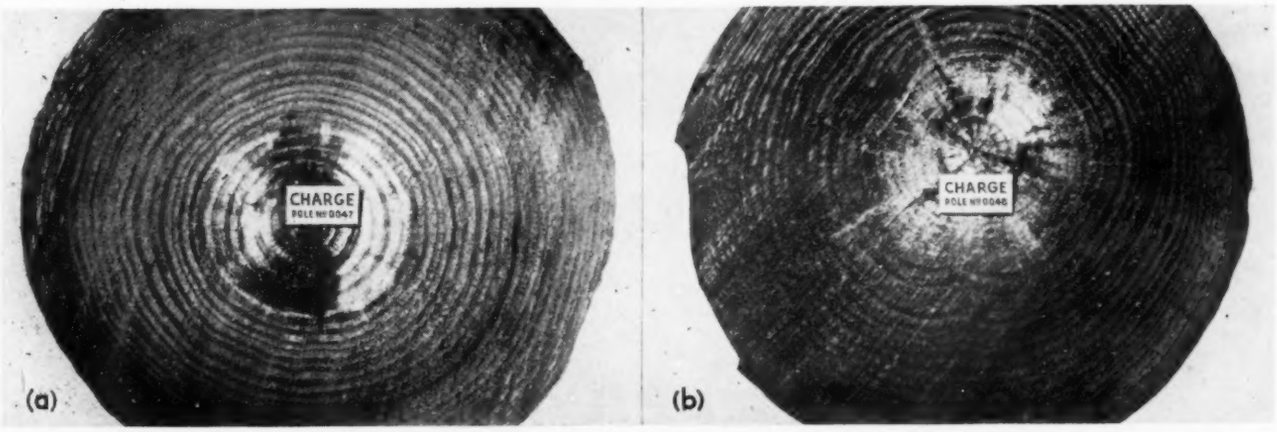
The Taylor-Colquitt Vapor Drying technique for processing poles marks the greatest advance in pole preserving methods since the establishment of modern processing standards. Here is what vapor drying does. It retains the original tensile strength of green poles, increasing the breaking resistance by 20 per cent over that of steam dried poles. Permits deeper penetration and more even distribution of the preserving charge. Eliminates bleeding by retaining a higher percentage of the charge ***deeper in the grain.*** Reduces moisture content as much as 150 pounds per pole, depending on size.

You will want these better Taylor-Colquitt Vapor-Dried poles for new installations and for current replacements. Specify them on your next order for poles.

Figure (a) shows relative penetration of preservative in pole processed by steam-dried method.

Pole in Figure (b) processed by vapor-drying method shows deeper, more uniform penetration.



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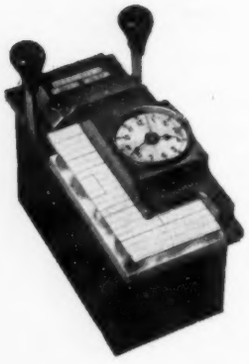

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Kellogg 1000 Series Masterphones

Kellogg 1000 Series Masterphones grace the homes of many thousands of subscribers. From Independent telephone men, who installed them, comes this universal opinion: Subscribers rate these instruments the most attractive they have ever seen.

And these modern telephones have beauty of another kind—the beauty of precision engineering and design. Kellogg Masterphones are noted for their simplicity, compactness and rapid interchangeability of components — advantages that assure maximum operating efficiency and minimum maintenance cost.

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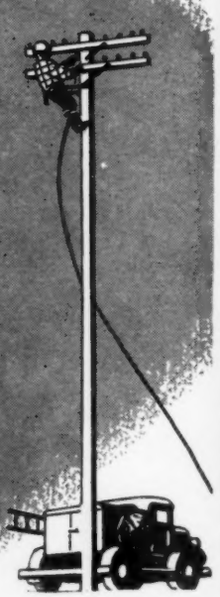
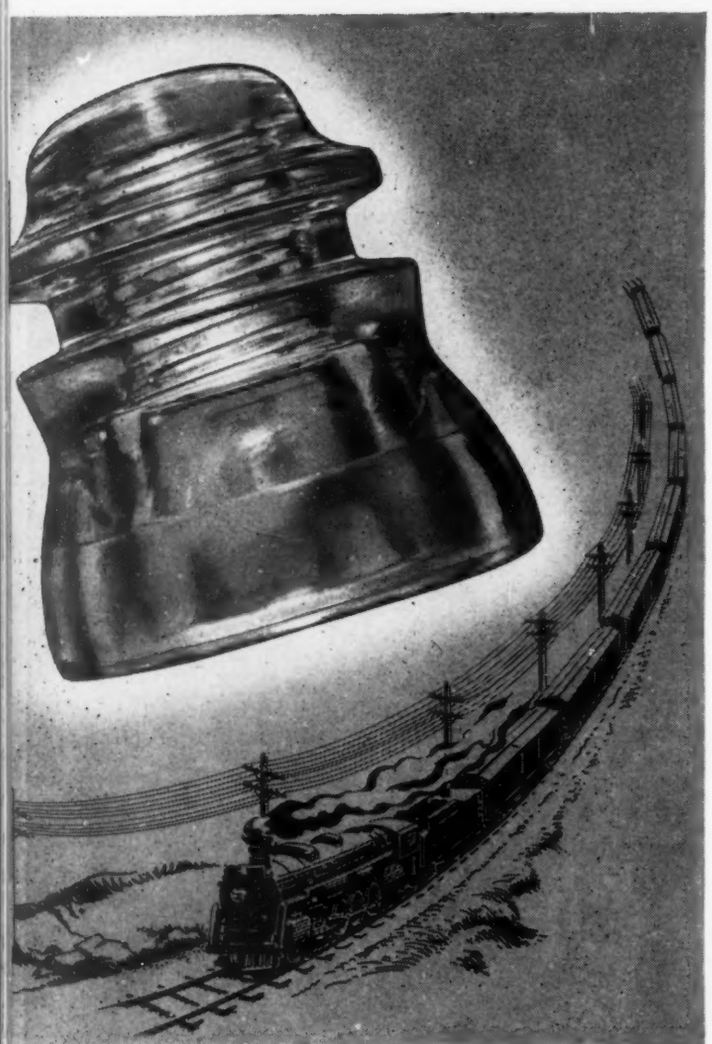


Dependable is the word that best describes "Eveready" "Columbia" "Gray Label" telephone dry cells. Dependable because they are manufactured by NATIONAL CARBON COMPANY, INC. under rigid laboratory controls that assure uniform high quality—extra days of service. Dependable because their sustained voltage means improved transmission.



Meet Every Service Need. No matter what your requirements, there is a size and style of Armstrong Glass Insulator to meet it. Made by ARMSTRONG CORK COMPANY, they feature crystal clarity of glass, accurate gauging, and unusual resistance to temperature changes. For lower maintenance costs, use Armstrong's Glass Insulators.

There's three-way satisfaction when you concentrate purchases of line supply and constuction materials at a single, responsible source: (1) The *quality* is right—all products are backed by the famous Kellogg DOUBLE GUARANTEE; (2) The service is right—orders are intelligently handled by experienced people; (3) *Delivery* is right—orders are shipped from the nearest of over 100 strategically located distribution points.

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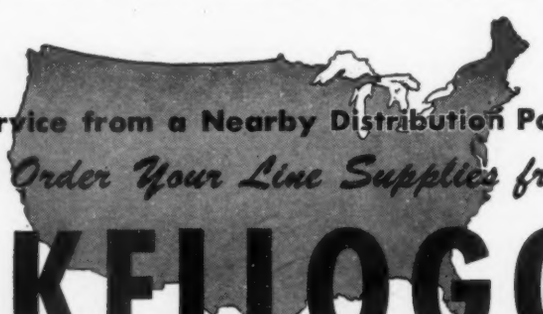

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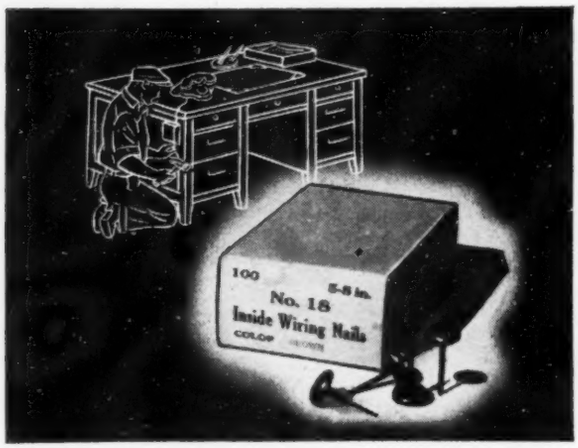
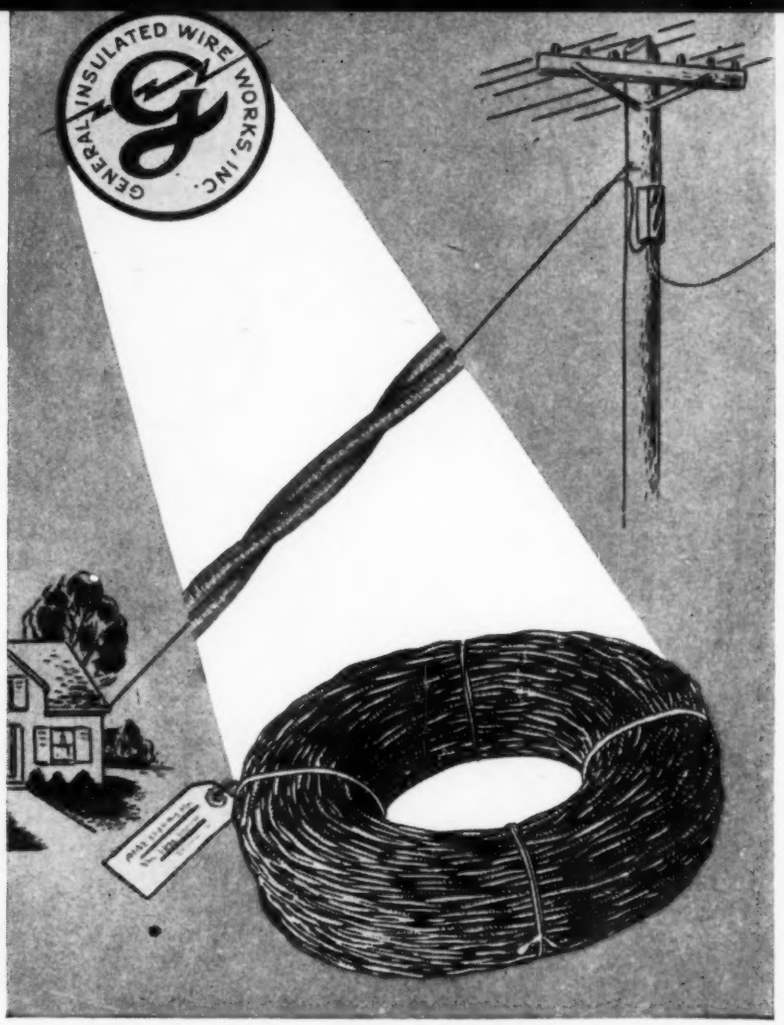
Neat Precision Soldering is easy when you use a Vulcan Electric Soldering Iron. Made by VULCAN ELECTRIC COMPANY in 15 sizes of screw and plug tip types, these irons give unimpaired heat production. The "Pygmy" tool, shown above, is specially designed for delicate work.

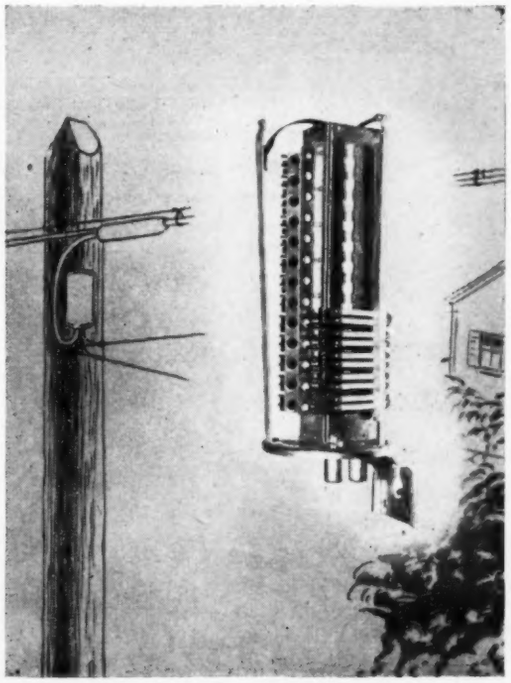


It's a Snap to make neat installations with Rhodes Telephone Wiring Nails according to telephone men who use them exclusively. M. M. RHODES & SONS maintain the uniform high quality of these nails by putting them through rigid driving, withdrawing, bending and immersion tests.

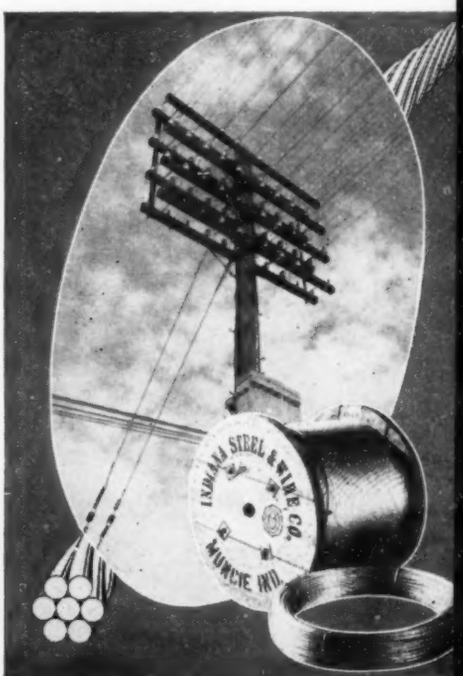


Increase Drop Wire Life 30% by using GENERAL INSULATED WIRE WORKS Bronze Drop Wire. This high-conductivity wire is drawn of solid non-corrosive bronze and covered with Neoprene, the insulation that stands up under tough punishment. Its unusually high tensile strength is combined with exceptional flexibility for easy handling.

Reduce Your Operating Costs with GOULD Floté Telephone Batteries. Experience of many telephone engineers proves that the famous Floté element eliminates low cells in full float service, lowers maintenance and charging costs, and lengthens battery life. Ask today for full data.



Nothing to It! Sectionalized cable runs simplify trouble shooting and transmission testing. The COOK ELECTRIC CO. UA-20 Cable Terminal permits easy testing in either direction. With capacity for 51 pairs, it provides highly effective lightning, power cross and static protection.



The Time-Tested Steel Strand. A ductile, adherent zinc coating applied by the famous Crapo Galvanizing Process, provides lasting protection against corrosion in INDIANA STEEL & WIRE CO. Crapo Steel Strand. Its rugged strength minimizes maintenance expenses.

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From the factories of Automatic Electric Company and its affiliated manufacturing organizations come telephone equipment, telephone instruments, and telephone wires and cables which are world-famed for their quality. Following this reputation around the world has come a growing demand for these products, from telephone companies and operating administrations everywhere.

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We are affiliated, in our Group, with telephone companies operating in seventeen states in the United States, also in Canada and elsewhere. The International AUTOMATIC ELECTRIC Group thus has available the experience of these operating companies, and offers the necessary technical skill and operating experience for the engineering and installation of telephone plants of any size in any part of the world, and is prepared to finance such plants if and as desired by any customer. All inquiries will receive prompt attention.

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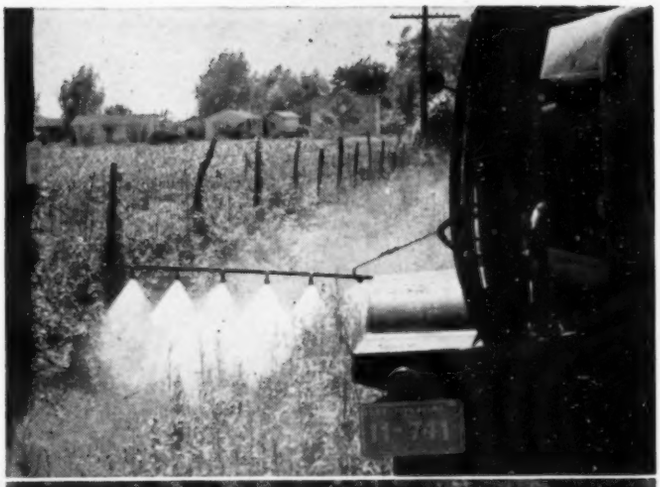
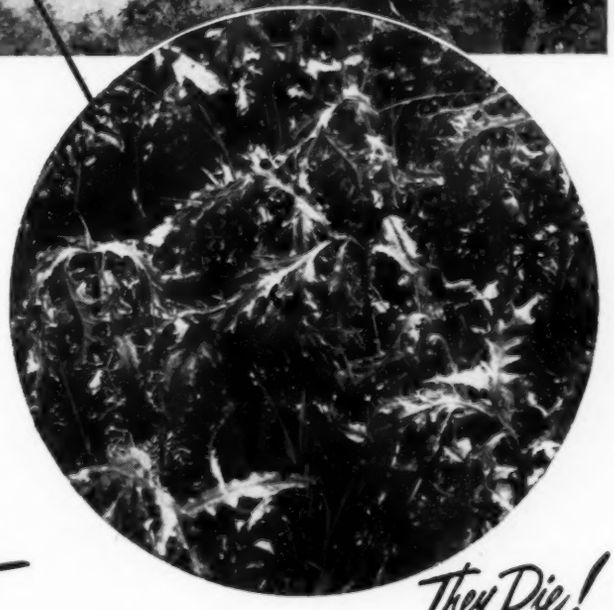
Here's how Esteron 44 kills

Tough, stubborn weeds . . .

and woody growth!





Dow Weed Killers mean business! When stubborn, troublesome weeds threaten to take over the right of way, modern maintenance crews give 'em a good dose of Esteron 44—the powerful 2,4-D Weed Killer created by The Dow Chemical Company to destroy *woody stubble* and *cut-over brush.*

Esteron 44 has proved effective against such plants as alder, aspen, willow—box elder, sassafras, elderberry—honeysuckle, locust, poison ivy, wild cherry, grape and sumac—and a long list of others, which are expensive to cut, mow or burn.

Do not take half-way measures! Get the facts from the "firing line"—where the weeds are dying! See the case histories for yourself. Ask your usual source of supply—or write direct to Dow for free literature on Esteron 44; also 2-4 Dow Weed Killer and Dow Contact Weed Killer.

They Die!

Esteron 44 destroys or inhibits herbaceous and woody growth, spares grass and allows the establishment of good sod.

Cut maintenance costs with—

DOW WEED KILLERS

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DOW

CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

EDITORIAL

"Boom Growth"

WE TALKED the other day to a telephone manager who was so low in spirit that he could have done a high jump under a blade of blue grass.

"We've got about 2,200 stations in service at our largest exchange," he said. "This is more than we have ever had before. At the beginning of this year we had 196 held orders. Since then we've installed 164 telephones. But when I left home last week we had 212 held orders. We'll probably have four or five more when I get home in a day or so.

"We're installing telephones, wherever our facilities will allow, as fast as we can get the stuff and labor to do it with. But we can't catch up with the demand.

"We've got additional central office equipment on order, and we're hustling to get cable wherever we can. We're going to be compelled to extend our plant in all directions in order to meet the demand for service. At the rate we are going we'll have 2,500 to 3,000 stations in this town in a couple of years if this demand keeps up."

"What bothers me," explained this manager, "is the question of whether this town will support all those telephones in any but boom times. If it won't, then we're going to have a lot of telephone plant that we don't need, and we're going to have to pay interest on a considerable amount of unnecessary investment, and do that out of depleted revenues."

This manager is not alone in his predicament. From all sides come stories of an unprecedented demand for telephone service, which demands, if they are met, will require unprecedented additional investments in telephone plant.

This matter of additional investment would not be so serious if there could be assurance that it will be needed permanently. But many telephone companies, checking up on the quality of their present held orders, are finding that a large percentage of the orders now being received are of a marginal character; that is, of a type likely to fade out, as subscribers, if and as soon as employment begins to fall.

A situation of this kind is dangerous to many telephone companies. The nature of the business of supplying telephone service is such that the telephone company must make all the investment required for installing a telephone. In most cases any service connection charge hardly pays, in these days, for the labor used in installing. The telephone company makes all the investment and takes all the risk of the subscriber keeping the telephone long enough to justify the investment made.

Under the theory that a public utility company must meet all the demands upon it for its services, the public holds a blank check against the telephone business.

Probably no one questions the general belief that—barring a severe depression, which seems unlikely—the level of telephones in service will be higher in the future than before the war. The big question is the lasting quality of a lot of the installations now being demanded. The percentage of these marginal demands is becoming higher, since most companies have done all they can to take care of the more solid applicants.

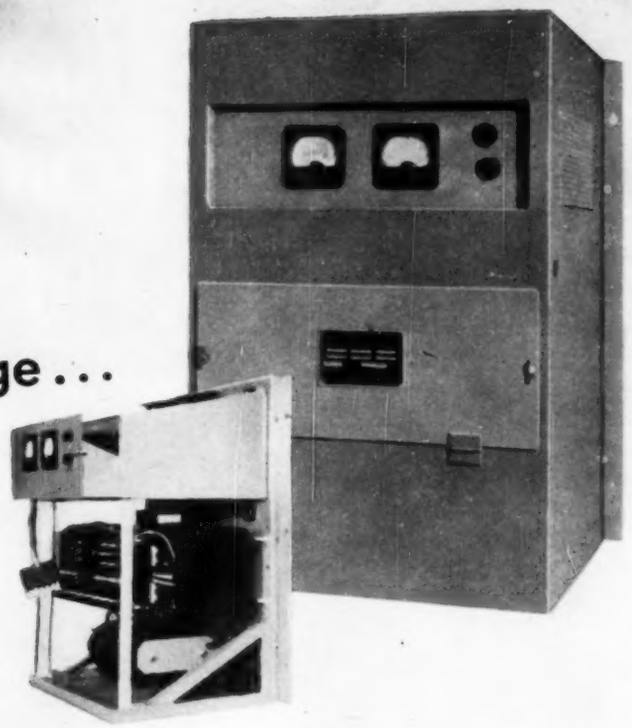
During the war telephone installations were made on a selective basis. The present situation as to the demand for telephones seems to call for a procedure of common-sense selectivity.

Boom growth is dangerous growth in the telephone business.

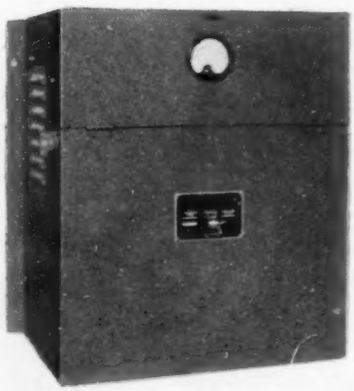
Greater Flexibility...

Greater Frequency Range...

Closer Regulation...



with the NEW RAYTHEON ELECTRONIC RECTICHARGER



To the high-power end of the well-known Raytheon RectiCharger line has now been added this new electronic model...available in capacities up to 24 amp. at 24 volts, or 12 amp. at 48 volts.

Compactness has been achieved by use of an electronic amplifier in conjunction with a saturable core reactor. In addition to a variety of input and output voltage combinations, this unit provides greater flexibility of adjustment, greater frequency range, and closer tolerance of regulation.

Long-life dry plate rectifiers, sturdy magnetic components and well-ventilated case make the Raytheon *Electronic* RectiChargeR a thoroughly effective and reliable telephone power supply.

For details, write for Bulletin DL-RCR-506

the RAYTHEON RECTIFILTER

OUTLASTS BATTERIES many times.

ELIMINATES TROUBLE and expense of routine service for battery inspection.

RELEASES WIRE carrying charging current from the central office to subscribers' PBX boards for revenue producing service.

MINIMIZES POWER COST because of high efficiency in converting AC to DC.

Write for Bulletin PL-RFR-508

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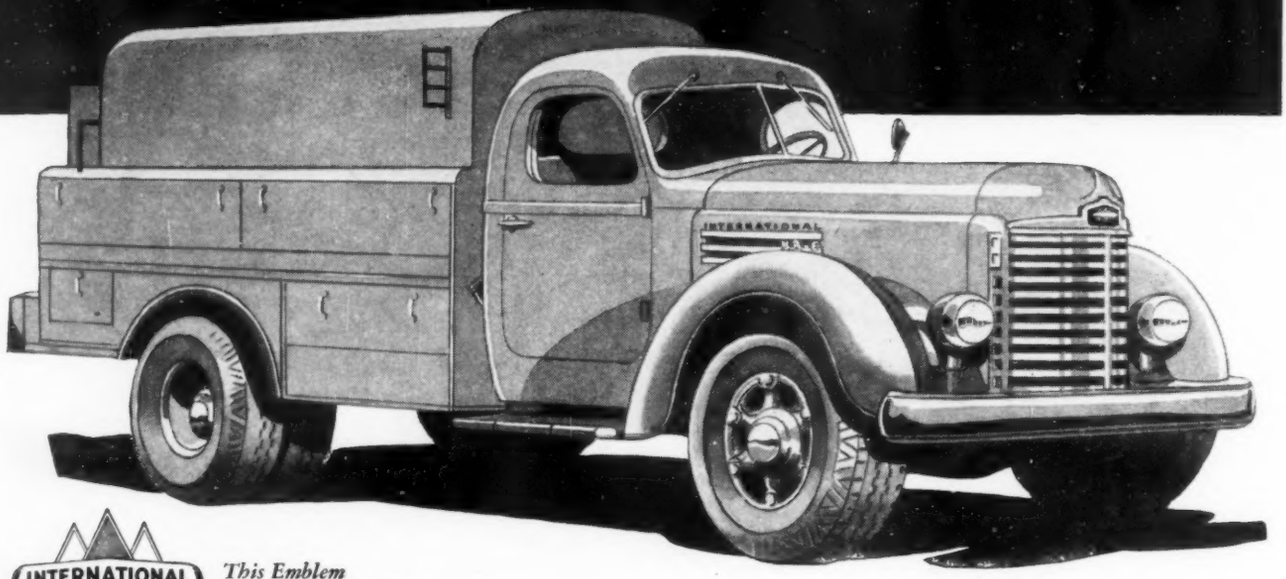

INTERNATIONAL *This Emblem Identifies Great Trucks*

Today's Internationals are the finest values in International Truck history. And International values are so outstanding that for each of the last 15 years more heavy-duty Internationals have been bought by American commerce and industry than any other make.

But rugged quality is only one reason for International leadership. Another is International's masterful ability to *specialize* trucks to their jobs.

There are 22 basic International models. Gross weight ratings range from 4,400 to 90,000 pounds. Thirteen different engines are used. Axles, transmissions and tandems are available for every requirement.

International specializes its 22 basic models into more than 1,000 different type trucks—a result of 40 years' experience, engineering skill and matchless facilities. *That's job fitting!*

Now add this: International can accurately tell every operator just what his maximum loads should be in terms of the exact conditions under which his trucks operate—an exclusive International service that enables the operator to get the most in operating economy, low maintenance costs, and long, trouble-free performance.

For details of today's Internationals, *expertly specialized,* see your International Dealer or Branch.

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1907-1947—Forty years of International Truck Service to Industry, Commerce and Agriculture

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INTERNATIONAL

INTERNATIONAL *Trucks*

NEWS BRIEFS

Lincoln (Neb.) T. & T. Plans Huge Improvements

The Lincoln (Neb.) Telephone and Telegraph company plans extensive improvements to its property within the next three to five years, John H. Agee, vice president and general manager, recently announced.

Mr. Agee gave the information in connection with the hearing held by the Nebraska Railway Commission to determine whether or not the company is entitled to the rate increase it has applied for.

The company has already spent considerable sums so far this year for improvements, expects to spend an additional $500,000 yet this year and will spend three to five million dollars in the next three to five years, depending upon how soon necessary equipment becomes available, Mr. Agee testified.

The general manager testified that improvement of the Hastings, Neb., exchange alone will cost about $1,000,000. He related that to give Johnson county complete automatic telephone service the company had spent about $185,000 in recent months.

The company also plans to convert all telephones to the automatic system. He stated these improvements will not bring in additional revenue except as new subscribers are added.

◆

Minnesota Telephone Co. Buys International Falls Co.

The International Telephone Company, International Falls, Minnesota, has received authority from the Minnesota Railroad & Warehouse Commission to sell its capital stock and all of its telephone properties to the Minnesota Telephone Company. Through the purchase, the Minnesota Telephone Company added approximately 1,522 local and 263 rural stations to its telephone holdings in the state of Minnesota.

The International Telephone Company had received authority to increase its rates shortly prior to the sale. In its rate application the company introduced evidence showing $196,127 to be the estimated original cost of the plant and equipment used in rendering telephone service. The commission found a rate base of $160,000 as reasonable for rate making purposes.

◆

Underground Cable For Argyle, Minnesota

Operations have been started in Argyle, Minnesota on an extensive modernization and improvement program by the Minnesota Telephone Company.

The entire wire system will be replaced by an underground cable system, and the entire system will be changed over to a completely automatic system.

◆

$21,000 Improvement Program For Gilroy, Calif.

The Gilroy (Calif.) Telephone Company expects to spend an estimated $21,000 on the purchase of new equipment and installation materials by 1947, according to manager Kirby McAtee.

Present plans call for expanding the one-floor office to include the lower floor of the telephone building.

In the remodeled building the business office will be located on the ground floor; switchboards and the manager's office will be on the second floor. A mezzanine floor will be built to house a $5000 air-conditioning and heating system.

◆

Rate Increase Approved For Indiana Bell

The Indiana Public Service Commission has granted Indiana Bell Telephone Co. increases in exchange rates and charges; increases in service connection, move and change charges; and an increase in the overtime rate for intra-state long distance calls from one-fourth to one-third of the initial period rate.

These new rates and charges will provide an estimated $2,357,000 annually in additional gross revenues and were the same as suggested by the company at the public hearings. The exchange rates became effective with customers' bills dated on and after August 16 and the change in the overtime charges on toll calls was

◆

Improvement Program For Meadville, Pa.

Vice-president L. E. Whiting of the Meadville (Pa.) Telephone Company, has announced that additional equipment "to improve and extend facilities" of the company at the Meadville exchange is under way.

The major improvement project follows by three years the installation here of a $200,000 automatic system.

Mr. Whiting said the new equipment will replace part of this original installation and will provide central office facilities "to care for the rapid growth being experienced in Meadville."

Next Month

The October issue of Telephone Engineer and Management will bring the Golden Jubilee Convention of the United States Independent Telephone Association right to your desk.

Our editors, writers and the TE&M camera will present the complete convention story in words and pictures—in fact the only thing we will be unable to bring you is a slice of USITA's 50th Birthday Cake! You'll have to attend the Convention to get that.

Don't Miss the October Issue of

TELEPHONE ENGINEER and MANAGEMENT

WASHINGTON

Bureau REPORTS

BY ROLAND DAVIES and FRED HENCK

Labor

AS THE LABOR law of the land, the Taft-Hartley Act may be amended, repealed, or ruled unconstitutional in the courts in the next year or two. But meanwhile it will have profound effects on the labor and labor union situations of the telephone and communications industries, competent observers feel.

Although the Communications Workers of America—the former NFTW—and the International Association of Machinists, which has organized some telephone manufacturing plants, were quick to comply with the full requirements of the Act before the first deadline, the actions of the CIO and AFL unions in the field remained shrouded in doubt as this column was written. It appeared, however, that the AFL International Brotherhood of Electrical Workers would go along with the Taft-Hartley Act and its proviso that unions register with the Labor Department and that their top officials file "non-Communist" affidavits, while the CIO groups—the Telephone Workers Organizing Committee and the American Communications Association—would be less likely to comply.

Assuming for the moment that the present Taft-Hartley Act will stand unchanged in its fundamentals until at least early 1949, the situation poses what appears to be an almost insuperable problem for fledgling unions like the TWOC which are attempting to organize workers and be recognized as their bargaining representative. For if the CIO refuses to go along with the Taft-Hartley Act, the TWOC cannot enter into any labor election under the auspices of the National Labor Relations Board nor can it be certified by the NLRB in any bargaining unit.

This does not immediately affect any union which might desire to affiliate with the TWOC and which already has a contract with the employer. However—and it's an important however—a rival union can go into such a bargaining unit and demand an election by obtaining the signed authorization of 30% of the workers. In some cases the requirement is much less than 30%. Besides, there are situations in which an employer can ask for a labor election in his company. In either event, the non-complying union cannot appear on the NLRB ballot, and thus defaults in the election to NLRB-recognized organizations.

There's another important consideration. Theoretically, the TWOC can move into any unorganized plant, secure dues deduction cards from 50% or more of the total number of employees, obtain recognition from the employer as the bargaining representative, and sign a contract. In actual practice, however, this assumes that the other unions will sit idly by and not make a fight of it. If they make any kind of a fight at all, they can get an election from the NLRB—and the non-complying union cannot go on the ballot. Even if they don't have an opportunity to compete for the plum in question, it is always difficult to get 51% of the total employees of a given company to join anything. Unions don't get recognition that way as a general rule—they get it through NLRB elections and the approval of a majority of **those voting,** not the total bargaining unit.

Meanwhile, the CWA scored one of its most smashing victories in months when the members of the Ohio Federation of Telephone Workers voted to join its ranks. The Ohio referendum had been regarded as particularly important, both because of the substantial number of employees involved—10,000 union members, 12,000 in the bargaining unit—and because of the effect on morale of the competing unions in its election results. Both the CWA and the TWOC had spared no efforts to bring the Ohio workers into their respective folds, and the CWA triumph had been indicated earlier in the phrasing of the referendum question, which was not a choice between the two, but "yes" or "no" on whether a CWA charter should be sought.

As a result, the Ohio union officials were moving ahead to obtain a charter as a CWA division, and there was no doubt that CWA would be extremely happy to provide them one immediately.

Another situation which labor observers are watching carefully as a gauge to public opinion and union reaction to aroused public officials is in New York, where Mayor William O'Dwyer is bending every effort to bring the long-standing jurisdictional dispute between the United Telephone Organizations, an independent group of New York Telephone Co. plant workers, and the IBEW, to a close.

It comes as a hopeful sign to telephone officials harassed by jurisdictional difficulties over installations and construction to see Mayor O'Dwyer, generally regarded as pro-labor and an

(Please turn to page 83)

An Invitation

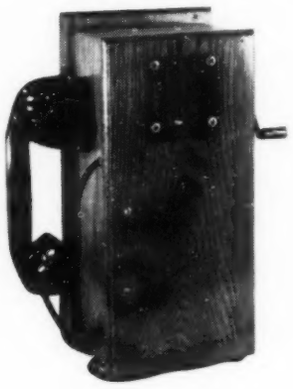
THE GOLDEN Jubilee Convention of the United States Independent Telephone Association at the Stevens Hotel, Chicago, on October 14, 15, 16 is going to be open to every Independent telephone company in the United States.

The officers of the Association in asking us to emphasize this have stated that it is not necessary for an Independent operating company to be a member of the USITA in order to be permitted to attend. Why not make your plans now to be present, whether a member or not? We know that a cordial welcome awaits you.

Modern Handset Magneto Telephones

IN STOCK--IMMEDIATE SHIPMENT

NEW



The BANTAM MAGNETO WALL TELEPHONE

SMALLER CABINET, requiring only 13"x15" of wall space, is strongly built and nicely finished.

LATEST STYLE HANDSET of handsome black plastic with sealed capsule type transmitter and receiver units provides exceptionally clear voice transmission and long, trouble-free service.

THE ELECTRICAL CIRCUIT is that used by the Signal Corps on telephones similar to farm telephones. It includes an anti-sidetone induction coil and a condenser in the receiver circuit.

THE MIGHTY MIDGET GENERATOR, equipped with Alnico magnets, is extremely small, measuring only 3½" x3½"x4", yet more powerful than many of the largest old style 5 bar generators, insuring plenty of ringing current to overcome adverse conditions. Alnico magnets are fifteen times more powerful than good magnets of the old style.

"SILENT RING" wired so that the bell will not ring when calling central or making other outgoing calls. The ringing circuit is so arranged however, that incoming calls will ring even though the handset is off the hook. ENDORSED by and now being installed by many of the largest of the independent operating companies in the country.

UNCONDITIONALLY guaranteed to give satisfactory service.

Bantam Magneto Wall Telephone with 1600 ohm ringer **$28.00**

Bantam Magneto Wall Telephone with 2500 ohm ringer **28.50**

"LIKE NEW" Rebuilt Telephones

Magneto Handset Wall telephone in "compact" new, oak cabinet with Alnico generator, (4 bar equivalent) fine black plastic handset providing capsule type all position transmitter and receiver, anti-sidetone coil and condenser. All parts refinished to "Like New" appearance and rigidly tested to "Like New" standards.

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Commemorating

FIFTY YEARS OF SERVICE

to the

INDEPENDENT TELEPHONE INDUSTRY

by

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UNITED STATES INDEPENDENT TELEPHONE ASSOCIATION

Munsey Building, Washington, D. C.

50 Years of INDEPENDENT TELEPHONY

BY E. C. BLOMEYER

(Copyright 1947, E. C. Blomeyer)

History of the Independent telephone industry's 50 years of service to the United States reveals wealth of achievement.

THERE FREQUENTLY arises the question of why, in a world in which the supplying of telephone service is a governmental or private monopoly in many important countries, there should be in the United States many ownerships and managements of telephone systems providing service to the public.

In this country, in addition to the some 7,500 telephone exchanges owned and operated in the great metropolitan areas and elsewhere by the 22 operating companies of the Bell Telephone System, there are some 12,000 exchanges owned and operated by more than 6,000 separate telephone companies—commonly known as the "Independents"—not owned or controlled by the Bell Telephone System.

The answer to the why of this situation lies in the history of the telephone industry in the United States.

That answer discloses a most significant fact: That, of all the countries of the world, the greatest and most rapid development of the telephone has taken place in that country —the United States— which has the widest diversity of telephone ownerships and managements.

The Independent segment of the telephone industry has been called the "unknown industry" because, at least until recent years, relatively few people outside the telephone business have known of its size and of its importance, past and present, to the telephone industry as a whole. Many people today do not know of its existence.

Independent Companies Operated in 1889

YET INDEPENDENT telephone companies were in operation even before the basic patent on the telephone transmitter, issued to Alexander Graham Bell in 1876, expired in 1893. (Bell's second important early patent, on the receiver, was issued in 1877 and expired in 1894.) There are in fact records of Independent telephone companies operating as far back as 1889, some of which had been supplying service for several years before that time.

The Independent segment of the telephone business is not, therefore, a fledgeling industry. The important

and highly constructive part it has played in the development of telephony in the United States is vividly portrayed in the history of the telephone industry in this country.

We shall attempt to sketch the highlights of that history, and to show the very good reasons for the coming of the Independents, for their existence during those turbulent years of warfare between them and the early management of the Bell Telephone System, and for their existence now.

The reasons for the coming and growth of the Independents are not hard to analyze. If Mr. Bell had invented the washing machine or the electric fan or some other device of like importance instead of the telephone, he and his associates could no doubt have introduced their product throughout the country in a more orderly way. They could have taken their time about extending their business, enlarging the scope and territory of their activities as the necessary capital, manufacturing facilities and organization became available to them. They could have gone into the large cities first—as they naturally did with the telephone—letting the smaller towns and cities wait until they could get around to them.

Under such circumstances they could have controlled the situation for a long time and could have made their own terms and conditions for the use of their device. By the time their basic patents expired they would have had their product so well established and their method of doing business so firmly seated that competition would have been sporadic and of a nature to be dealt with fairly easily.

The lines went from roof top to roof top in the early days.

The trouble with any such plan as this was that the telephone was not simply a gadget which made life a bit easier. It was a thing which changed ways of life. The moment it became possible, by the erection of some wires and the installation of some easily manufactured equipment, for persons to converse over considerable distance, new values were added to life, new customs were made possible, and new methods of doing things came into being.

The telephone was, in short, too important in the lives of many people to be left to the control of any one set of people. The remainder of the country was unwilling to wait until Mr. Bell and his associates got around to supplying it with telephones. It wanted, and needed, its telephone now. It got them in very many cases from locally organized and locally owned companies—the Independents.

At the time the Bell receiver patent expired early in 1894 the then Bell System had, principally in eastern cities, some 237,000 exchange subscribers. This was the growth that had been made by the Bell organization in 18 years. Meanwhile the Independent movement had progressed so rapidly that in the year 1894 a partial roster of Independent exchanges then in operation or under construction included 116 cities and towns in widely scattered parts of the country.

Independents Brought Service to Many

IT IS UNDENIABLE that the entrance of so many people into the telephone business greatly expedited the availability, growth and use of the telephone in the United States. Chalk up one first good mark for the Independents, therefore—they made the telephone available much more quickly to many more people than could possibly have been done by any one organization. It is partially the impact of that early rapid growth of the telephone that made and has kept this country the greatest user of telephone service of any country in the world.

It may well be that there should be chalked up to the credit of the Inde-

FOREWORD

THE undersigned special Program Committee was appointed by the Directors of the United States Independent Telephone Association for the purpose of arranging the program of the Golden Jubilee Convention of the Association at Chicago, October 14, 15, 16, 1947, commemorating the 50th anniversary of the organization of a national Independent telephone association. The Committee was also instructed to carry on the publicity and to do such other things as it considered fitting to the occasion.

The Committee considered this 50th anniversary to be a highly fitting time for the preparation and publication of a brief history of the inception and growth of the Independent segment of the telephone industry in the United States. It asked Mr. E. C. Blomeyer, long identified with Independent telephony and active in the Association's work for many years, to write such an article, which he has done.

We regret that it has been impossible to name in this article any of those stalwarts of Independent telephony who did so much to make this history. It would have been unfair to name one without naming all, and limitations of space made that impracticable. The same thing applies to the names of Independent companies and manufacturers.

Program Committee:
R. A. Phillips, *Chairman*
J. H. Agee
H. V. Bozell
V. E. Chaney
W. C. Henry

pendents another mark of great importance. It is very possible that the existence of Independent telephone companies preserved the telephone business as a privately-owned enterprise in this country.

In the late 1880's, just at the time the telephone was beginning to make its first important impress on the life of the nation, there was running throughout the country a high tide of feeling against private monopoly. A few monopolistic industries were riding the public ruthlessly and rough-shod. This situation culminated in the enactment by the Congress, in 1890, of the Sherman Anti-Trust Act, which prohibited "monopolizing, attempting to monopolize, or combining or conspiring to monopolize, any part of trade or commerce."

This was before the days of governmental regulation of utilities. Under those circumstances, it hardly seems likely that a public service of such then potential importance as telephone communications would have been allowed to exist very long as a private monopoly.

It is therefore very likely that, if there had been no Independent telephone companies at that time, the telephone would now be an adjunct of the Post Office Department in this country—just as it is now in other important countries of the world.

Another important mark—which we will discuss in more detail later—to the credit of the Independents is the great value of the contributions to the art of telephony that have been made by Independent manufacturers.

Independent Industry Not A Fledgeling Industry

THE INDEPENDENT telephone industry, as we have said, is not a fledgeling business. It has now been in existence for some 60 years—a fairly long time in this relatively young country of ours. Its history during those years, insofar as its relations with the Bell System are concerned, divides itself somewhat naturally into three principal phases or periods.

The first of these was that era of bitter competition, constant hostility and even, at times, actual physical warfare, between the then Bell companies and the Independents. It was during this period that there sprang up in many cities and towns—some 1,300 of them, in fact—competing telephone exchanges, not interconnected, one Bell-owned, the other—the Independent—usually locally owned.

During a considerable part of this period competition between Independents and Bell was of a dog-eat-dog variety, with no holds barred. It included such amenities as a constant procession of litigation, threats against the competitor's subscribers, undercover deals for the purpose of putting the competitor out of business, rate cutting, and other unpleasant forms of commercial battle as it was fought in those days.

The words at the right represent today's goal of all telephone companies.

We shall do everything in our power to speed the day when all who want telephone service can get it promptly, can get the kind of service they want, and as much of it as they want.

Independents Organize National Association

DURING THE early part of this period an event transpired which has been of much greater significance than perhaps even many telephone people realize. In May, 1897, a group of Independent men met in Chicago and organized the National Telephone Association. The following month, June, 1897, the association held in Detroit its first convention, attended by some 400 Independent telephone people.

This association and its successor national Independent telephone associations profoundly changed the course of the telephone industry.

A national association offered a rallying ground for all the Independents. Before the organization of the first association each Independent company had carried on its own private fight with the Bell, which had the great advantage of presenting, on its part, a solid and unified front.

The national association, which, with its successor national organizations, became more and more representative yearly of the entire Independent industry, crystallized the aims of the Independents, put organized strength behind them, and made them vocal on a country-wide basis.

Two issues became paramount. The Bell System was building up a large toll network; it would not connect with the Independent companies, whose toll lines—where they existed at all—were local. Also, the Bell System was gobbling up Independent companies at a rapid rate.

The Independents created a committee of seven prominent and forceful men, who carried on long negotiations with the Bell System principals. The first result was the issuance, in January, 1912, of a statement by Theodore N. Vail, then President of the American Telephone & Telegraph Company, of Bell System policies with respect to Independent companies.

These policies permitted, under certain conditions, the connection of Bell toll lines with non-competing Independent exchanges.

This expression of policy turned out to be more shadow than substance, so far as the Independents were concerned. Little progress was made under it in bringing about actual Bell toll line connections with Independent companies. Some of the Bell System operating companies were not disposed to go along with the policy; the contractual terms offered Independents were in many cases unsatisfactory, and the whole proposition sort of bogged down as time went on.

"Kingsbury Commitment"

BUT NOT quite two years after the issuance of the Vail policy statement there was an event which really meant something to the Independents. This was the making on behalf of the Bell System in December, 1913, of the famous "Kingsbury Commitment" to the Attorney General of the United States. This act by the Bell System was a milestone in the history of the telephone industry.

The Kingsbury Commitment, signed on behalf of the Bell System by American Telephone and Telegraph Company Vice President N.

(*Please turn to page* 78)

★

The FALL Construction Program

By

B. C. BURDEN

GETTING THE plant house in order now will save many a cold ride in January and February. Here are many construction and maintenance tips that will help your Fall construction program.

General

NOW IS the time to get the outside plant "house" in order before the coming winter storms. Extra effort expended in October and November may save many a cold ride in January and February. New construction and maintenance operations must take into account factors not present in prewar years. Some materials are still in short supply and this with currently high labor costs form a combination that makes planning for new construction or extensive plant repair difficult.

The Material Situation

THE shortage of certain materials may make extensive repair work necessary even though normally, taking into account the labor cost, it would be wiser to completely replace the worn plant than to make repairs. In seeking a solution to the material shortage problem we should not overlook the fact that often we can substitute materials which will do the job as well or better than the usual standard items. Badly deteriorated rural line wire is a case in point.

The current shortage of steel wire, can for example, be met by the substitution of Copperweld wire which is now available. The cost of Copperweld is of course, higher than steel wire but its high strength, long life and improved transmission may, in many instances at least, offset its initially higher cost. The definite possibility of multi-channel carrier systems (now being tried out in Minnesota) being used on rural and minor toll lines, makes a wire with transmission equivalents higher than iron or steel well worthwhile. The initial experiments with rural telephone line carrier systems indicate copper (or Copperweld) wire may some day be a necessity on rural lines.

Many of the smaller Independent companies have in the past considered iron or steel wire adequate for minor toll lines between nearby towns. But here again, the improved transmission characteristics of Copperweld (or copper) make it desirable that this type wire be used in place of iron on all replacements, thus making for an improved plant situation and also solving the shortage problem at the same time. This is a time when plant executives must be constantly alert and fully informed on the rapidly changing picture particularly with respect to new developments and their effect on plant design.

Field Inspection

THE FIELD inspection of outside plant to be replaced or repaired is the prelude to any construction project. This is an important phase of the project and requires the exercise of good judgment on the part of the inspector. He should be someone thoroughly familiar with all phases of outside plant construction and maintenance and competent to judge as to the remaining life left in existing plant, the best method of making repairs or replacements and the quantities of materials required for the project.

The field inspector should be fully informed by the Plant Superintendent or Plant Engineer prior to undertaking an inspection on the type of project to be undertaken, i.e., whether major reconstruction or only minor repairs are contemplated. He should be provided with maps and forms on which he can record the field information and his recommendations.

The extent to which poles should be replaced will depend on whether or not the line is only to be strengthened or completely rebuilt. If wires are to be added, rebuilding is usually desirable with old leads. Bell System companies make use of elaborate "pole inspection tables" which show the minimum ground line circumference which poles are allowed to reach before being replaced. These tables are carefully worked out and take into account storm safety factors, pole costs, etc. But the majority of the Independent companies have found that they can rely pretty much on a careful ground line examination of standing poles plus occasional pike pole "push tests" as a means of determining whether a pole should be replaced.

In recent years the resetting of untreated poles in order to get eight or ten years additional life has not been felt warranted by many companies. The present high price (and occasional scarcity) of poles plus the availability of power type diggers has to some extent changed this thinking. Now some companies are finding, even with higher labor costs, that it is often economically feasible to reset poles particularly on farm and unimportant toll leads.

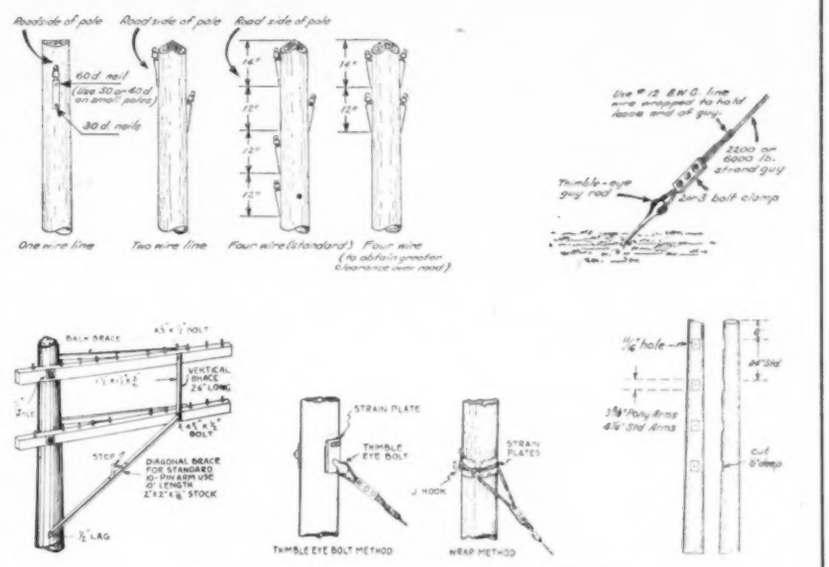

Roadside of pole
Road side of pole
Road side of pole
60 d nail
(use 50 or 40 d on small poles)
30 d nails
One wire line
Two wire line
Four wire (standard)
Four wire (to obtain greater clearance over road)
Use #12 B.W.G. line wire wrapped to hold loose end of guy
2200 or 6000 lb. strand guy
Thimble-eye guy rod
2 or 3 bolt clamp
BACK BRACE
VERTICAL BRACE 26" LONG
DIAGONAL BRACE FOR STANDARD 10-PIN ARM USE 9' LENGTH 2"x2"x6" STOCK
STRAIN PLATE
THIMBLE EYE BOLT
J HOOK
STRAIN PLATES
THIMBLE EYE BOLT METHOD
WRAP METHOD
11/16" hole
8'6" Std
3 1/2" Poly Arms
4 1/2" Std Arms
Cut 6' deep

Fig. 1—Practical construction practices.

Telephone men have never felt too kindly towards the stub reinforcement of poles largely because it is almost as much work to set a stub as to set the original pole. Furthermore this type of repair is generally considered more or less unsightly. However, there are still occasions, such as junction poles which carry a large amount of construction and the transfer cost would be high, where pole stubbing is still considered a good practice. The stub reinforcement of poles should employ standard hardware and strapping now available for this purpose and should not consist of wire type banding.

The inspection of pole lines for extensive repairs or replacement should always take into account the desirability of relocation along a better route. The pole lines placed years ago are, in many cases, along routes that are now undesirable as for example, along dirt roads, through "blind" miles, across private property, etc. The relocation of lines requiring extensive repairs will in many situations bring about sufficient improvement to more than justify the extra expense of relocation.

Inspection data should be collected on an inspection sheet similar to that shown in Fig. 2.

There is a tendency on the part of some inspectors to recommend the replacement of items of plant which show considerable wear but which still have many years of life left. This is done because of the usually mistaken apprehension that their supervisors may criticize them if all

Table No. 1—Average Labor Units for Use in Estimating the Cost of Outside Plant Construction.

	Labor Hours	
Digging Holes and Setting Poles		
16 ft.	1.6	
20 ft.	2.2	
25 ft.	3.0	
30 ft.	4.1	
35 ft.	5.1	
Stringing and Tieing in Wire		
109 (No. 12 BWG iron or steel)	5.1	(per wire mile)
104 (No. 12 NBS copper)	5.3	(per wire mile)
Drop wire	0.6	(per C feet)
Placing Strand and Cable		
25-22	7.2	
50-22	8.2	
100-22	9.2	
200-22	10.1	
25-24	5.9	
50-24	6.9	
100-24	7.8	
200-24	9.1	
300-24	10.1	
Placing Brackets, Arms and Anchors		
Brackets	0.06	
6-pin arm	0.29	
10-pin arm	0.31	
Anchor (large)	2.50	
Anchor (small)	0.50	

worn items of plant are not replaced. This tendency on the part of some inspectors to recommend "over repairing" often results in the uneconomic replacement of items of plant long before the end of their useful life. For example, iron or steel wire which is discolored, yet actually not rusted or pitted is often recommended for replacement by overzealous inspectors. This can be avoided by proper understanding between inspectors and supervisors.

Better Tools for Lower Costs

IN PLANNING the Fall Construction and repair program the advantages of using the new and improved tools which continue to be available through the telephone supply houses should not be overlooked. As this writer has said many times before, "Good tools pay their own way". A good tool will speed up and improve the quality of work. Typical of the newer tools which will save money by shortening the time for specific work items are: Quick heating electric soldering irons, cable sheath splitting tools, light weight ladders, aluminum gas (Prest-O-lite) type heating and brazing equipment, portable motor driven power saws, and portable motorized hole digging equipment, etc.

Telephone Trucks

MANY OF the smaller companies are handicapped by inefficient construction and maintenance trucks. A telephone truck is essentially a traveling store room and tool chest. If it is not properly designed with an adequate number of well arranged compartments for tools and materials, it slows up the work and results in inferior workmanship because of failure to carry all needed supplies. The modern truck body which is available through telephone suppliers are equipped with sliding compartmented material trays, hoods for climbers and saws, etc. Special racks for ladders, ropes, etc. Everything is orderly and easy to get at.

It is usually desirable to know the cost of new construction or major repair projects before the wor kis started. The larger companies arrive at the cost of a construction project by a detailed study of the material and labor costs involved and b·· applying average unit costs to all of the items of work proposed. Table No. 1 shows typical labor units for various plant operations. These units are average values and are not necessarily representative of all sections of the country, but the table should be useful to the smaller companies in estimating the cost of repair or new construction projects where data based on actual local cost experience is not available.

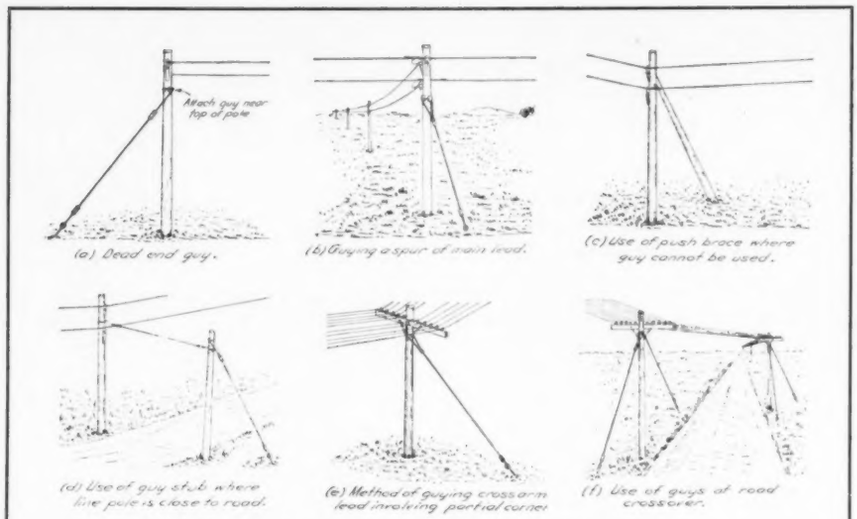

Attach guy near top of pole
(a) Dead end guy.
(b) Guying a spur or main lead.
(c) Use of push brace where guy cannot be used.
(d) Use of guy stub where line pole is close to road.
(e) Method of guying crossarm lead involving partial corner.
(f) Use of guys at road crossover.

Fig. 3—Features of rural line construction.

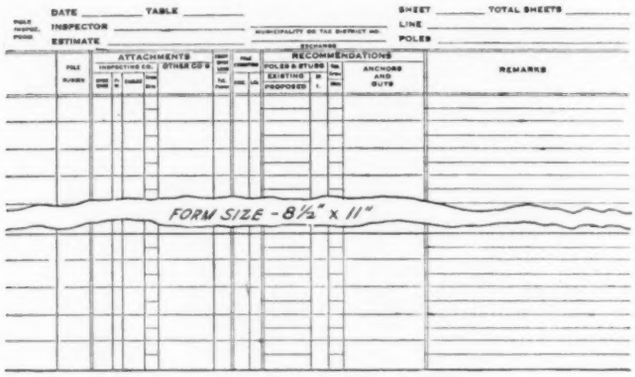


Fig. 2—Inspection data sheet.

Design Problems

TELEPHONE pole and wire plant should be designed to give good efficient modern telephone service at the lowest possible cost consistent with an adequate safety factor against storms. The class pole required to withstand average storm loadings can

(*Please turn to page* 84)

Table No. 2—Pole Line Design for Rural and Minor Toll Leads.

No. of Bare Wires (109 mil)	Class Pole and Span Lengths 150′	175′	200′	225′	250′	275′	300′	350′	400′
Heavy Loading									
1- 4	9	9	9	9	9	9	9	—	—
5-15	9	9	9	7	7	7	7	—	—
16-20	7	7	6	6	6	5	5	—	—
21-30	7	7	6	6	6	5	5	—	—
31-40	6	6	5	5	4	4	3	—	—
41-50	5	5	5	4	3	3	2	—	—
Medium Loading									
1-15	9	9	9	9	9	9	9	7	—
16-20	9	9	9	9	9	7	7	7	—
21-30	9	9	7	7	7	7	6	6	—
31-40	9	7	7	7	7	6	6	5	—
41-50	7	7	7	6	6	5	5	4	—
Light Loading									
1-30	9	9	9	9	7	7	7	7	7
31-40	9	9	7	7	7	7	6	6	5
41-50	7	7	7	7	7	7	6	5	5

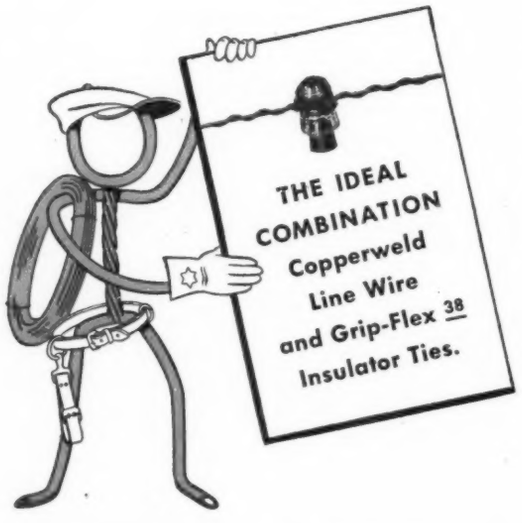
A FINE HEART DESERVES GOOD ARTERIES

With little in the way of new equipment available during the last six years, many telephone companies are now striving to improve their inside plant. Many, too, realizing the important role of the actual arteries of communication, are planning to place their outside plant on a par with the plans for their inside plant. They realize that a fine heart deserves good arteries.

Copperweld Line Wire, made by molten-welding a thick outer covering of non-rusting copper to a core of high strength alloy steel, rates high in any plan for modernizing the arteries of communication.

Copperweld has the best conductance of any high-strength conductor—is 2 to 3 times stronger than hard-drawn copper wire—has greater tensile strength than any wire of comparable electrical properties. Pliable, easily handled, light in weight and economical in cost, only Copperweld combines the high strength and ruggedness of steel with the conductivity and rust-resistance of copper.

Write for Engineering Data Bulletin 1683



COPPERWELD STEEL COMPANY
Glassport, Pa.
SALES OFFICES IN PRINCIPAL CITIES

Copperweld Line Wire

SOLD BY LEADING DISTRIBUTORS

REVIEW OF factors affecting damage of buried cables by lightning and suggested remedial measures. (Courtesy of Bell Laboratories Record.)

LIGHTNING PROTECTION O

by
E. D. SUNDE

FOR new toll facilities now being installed, much of the cable is being buried in the ground to secure greater immunity from the effects of sleet, snow, and storms of all sorts. It might seem that buried cable would also be free from the effects of lightning damage, but burying alone is not necessarily sufficient. Moreover, when damage by lightning does occur, such as fusing of cable pairs or holes in the sheath, it is not so easy to locate and repair as on aerial cables, since excavations may have to be made at a number of points. As a result of this situation, studies have been made of the factors affecting damage of buried cables by lightning, and remedial measures have been devised which are expected to provide substantial protection in most cases that are encountered.

When Lightning Strikes, The Current Spreads

WHEN LIGHTNING strikes, the current spreads in all directions from the point where it enters the ground. If a cable is in the vicinity, it will provide a low resistance path, so that much of the current will flow to the cable and in both directions along its sheath to remote points. The flow of current in the ground between the lightning channel and the cable may give rise to such a large voltage drop that the breakdown voltage of the soil is exceeded, particularly when the earth resistivity is high. The lightning stroke will then arc directly to the cable from the point where it enters the ground, often at the base of a tree. When this happens practically all the current reaches the cable sheath. Furrows as long as 100 feet have been found in the ground along the path of such arcs.

The current entering the sheath near the stroke point is attenuated as it flows toward remote points. The current leaving the sheath must flow through the adjacent soil, and the amount of this leakage current per unit length of cable is therefore smaller if the soil resistivity is high than if it is low. Thus the current will travel farther the larger the earth resistivity. The flow of current along the sheath produces a voltage between the sheath and the core conductors, which is largest at the stroke point. This voltage is substantially equal to the resistance drop in the sheath between the stroke point and a point which is sufficiently remote so that the current in the sheath is negligible. Since the higher the earth resistivity, the farther will the current travel, this resistance drop will also increase with the earth resistivity. The maximum voltage between sheath and core is thus proportional to the sheath resistance and, as it turns out, to the square root of the earth resistivity. Carrier cables now being used are of smaller size and have a higher sheath resistance than full-size voice-frequency cables, and for this reason they are more subject to lightning damage, particularly when the earth resistivity is high.

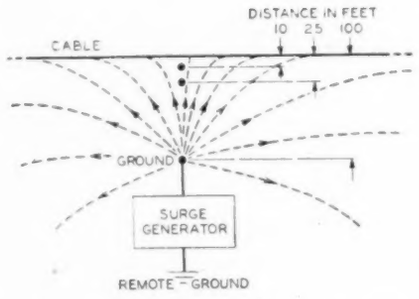


Fig. 1—Relative positions of various grounds and cable for surge tests.

To secure experimental verification of the theory outlined above, tests were made on the Stevens Point-Minneapolis cable, using a surge generator, which generates a short-time surge of current similar to that of a lightning discharge but of much smaller magnitude. A ground was established remote from the cable, and the surge generator was connected between this ground and the cable sheath, and between the remote ground and grounds at distances of 10, 25, and 100 feet from the cable, as indicated in Figure I. The voltage between conductors and sheath was then measured for various conditions. The results obtained with the surge generator connected between sheath and remote ground are shown in Figure 2, which gives both the current flowing into the sheath and the voltage between conductors and sheath as they vary with time. Allowing for the difference in the magnitude of the current, such a test would represent an arcing of the lightning directly to the cable. Voltages between conductors and sheath when the surge generator was connected between the remote ground and grounds near the cable are given in Figure 3. These voltages are plotted as percentages of the maximum voltage shown in Figure 2. Tests such as these are comparable to lightning strokes to ground at various distances from the cable when arcing to the cable does not occur. The observed voltages are in good agreement with those calculated for a cable of the size used in the tests on the basis of the earth

N OF BURIED CABLES

resistivity measured at the various test locations.

The voltages of Figure 2 were those observed at the point where the current entered the sheath. As the current flows along the sheath it is attenuated, however, with the result that the voltage decreases. The rate of decrease as obtained in the tests is indicated by the upper curve of Figure 4, where the voltage is plotted as a percentage of the maximum voltage of Figure 2. There is some unavoidable variation in the dielectric strength of the core insulation, and thus although the voltage decreases rapidly with distance, actual failure may not occur at the point where the current enters the sheath but at some distance away where the dielectric strength of the insulation may happen to be less.

When the voltage at the point where current enters the sheath is great enough to break down the insulation, the conductors and sheath are brought to essentially the same potential by the arcing. Under these conditions, the voltage between conductors and sheath will increase with distance along the cable as shown by the lower curve of Figure 4. A maximum is reached at some distance from the original fault, and beyond this point the voltage slowly decreases. After a puncture of the insulation where the current enters the sheath, other failures may therefore occur at some distance from this point in either or both directions. A single lightning stroke may thus cause insulation failures over a considerable distance along the cable.

Crest Value of Current Varies

THE CREST value of the current in a lightning discharge varies over wide limits. Measurements made largely with magnetic links by engineers of the power industry have indicated that a relationship somewhat like that shown in Figure 5 exists between various values of crest current and the percentage of the total flashes in which they occur. Although measurements of wave shape are not extensive, they indicate that the current reaches its crest value in from 5 to 10 microseconds, and it decays to half its maximum in from 25 to 100 microseconds—the average being about fifty microseconds. This type of wave shape was simulated by the surge generator used in the tests shown in Figure 1.

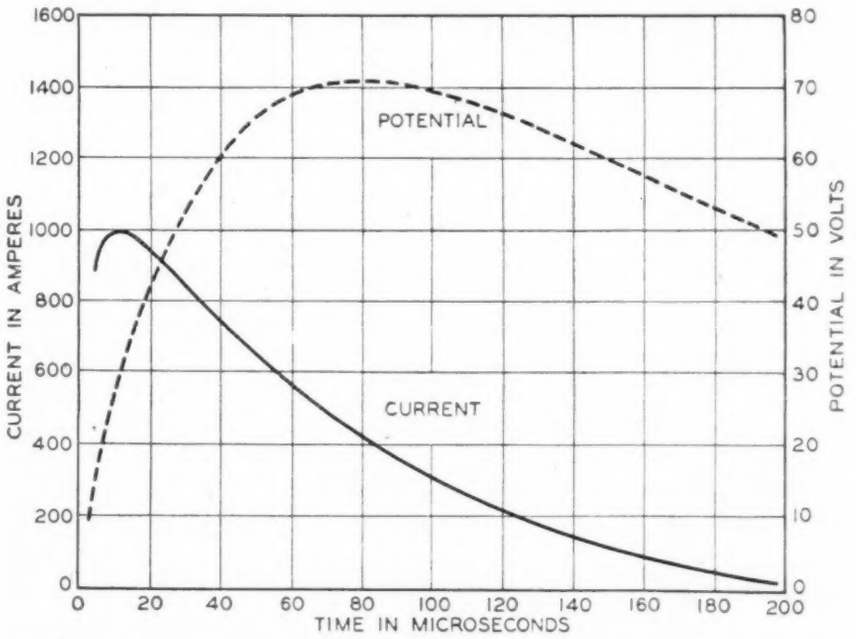


Fig. 2—Surge current and voltage between sheath and conductors during surge test.

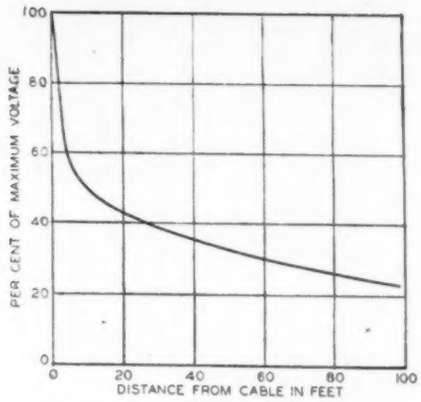


Fig. 3—Reduction in voltage between sheath and conductors as the ground, representing point of lightning stroke is moved farther from the cable.

For voltages of short duration, such as those arising from lightning strokes, the dielectric strength of normal core insulation is about 2,000 volts. Based on the data of Figure 2, this voltage would be reached for a lightning current of some 28,000 amperes for a cable of the particular size and construction tested, and—as shown in Figure 5—a surge of this magnitude occurs in about 50 per cent of the strokes. If the stroke reached the ground 100 feet from the cable, instead of arcing directly to it, the lightning current would have to be of the order of 127,000 amperes to cause a breakdown potential between conductor and sheath, and currents of this magnitude, estimated from Figure 5, occur in less than 5 per cent of the strokes.

Reduce Failure by Increasing Core Insulation

ONE METHOD of reducing failures caused by lightning strokes to buried cables is to increase the core insulation. This has been done for most new installations of buried cable. The cable itself, and such accessories as cable terminals and stubs, loading pots, and gas-alarm contactors are all provided with

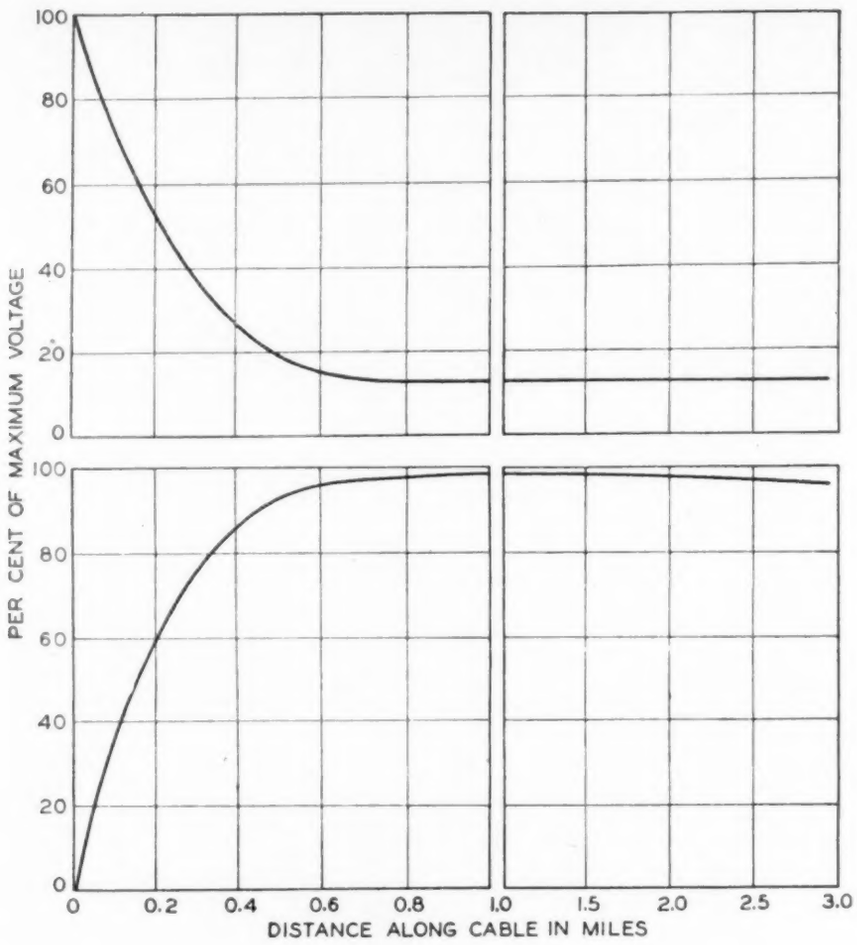


Fig. 4 (left)—Variation in voltage between sheath and conductors with distance along the cable. Top (left), when no breakdown occurs; below (left), when insulation breakdown occurs at points of lightning stroke.

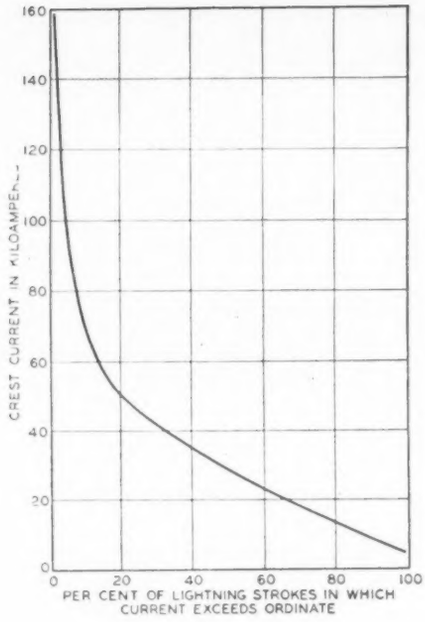


Fig. 5 (above)—Percentage of lightning strokes in which current exceeds the ordinate.

sufficient extra insulation to double the dielectric strength between cable conductors and sheath. For a cable like that on which the measurements were made, such increased insulation would reduce the number of lightning strokes that could cause failure by direct arcing to the sheath to about 15 per cent of the total instead of 50 per cent, and would almost entirely eliminate the danger of breakdown when lightning strikes the ground as much as one hundred feet from the cable.

Another method, which may be employed in addition to the extra insulation where excessive lightning damage would otherwise be expected, is to bury shield wires over the cable. These conduct away part of the lightning current and thus reduce the amount that flows along the sheath. These wires may be plowed in with the cable, or they may be installed afterward. When wires and cable are plowed in together, one of the practicable arrangements is that of Figure 6. The percentage of the current carried by the wires depends to a greater extent on their inductance relative to that of the sheath than on their resistance. Two wires are employed, rather than a single wire of smaller resistance, in order to obtain a lower inductance than would be possible with a single wire.

On the route between Stevens Point and Minneapolis, where the shield wires were installed after the cable was in place, two 165-mil copper wires about twelve inches apart were plowed in some ten inches above the cable for a distance of eighty miles. Surge measurements made after these wires were installed indicated that the wires reduced the voltage between sheath and core conductors about 60 per cent, in substantial agreement with theoretical expectations. The shield wires should thus reduce the number of direct lightning strokes that would be expected to cause failure to about 10 per cent instead of 50 per cent without shield wires.

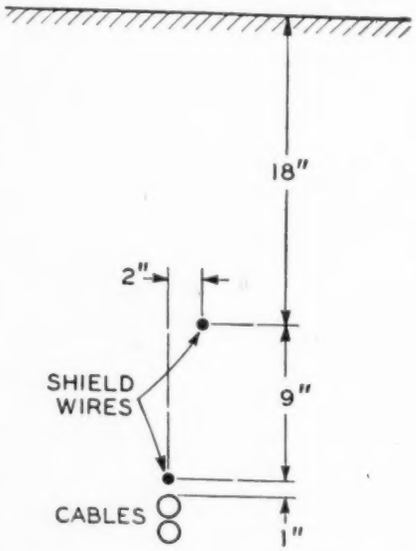


Fig. 6—Position of shield wires when they are plowed in with cable.

Advance Estimate of Remedial Measures

IN ESTIMATING in advance the need for specific remedial measures, the probable incidence of lightning strokes to the cable and to ground near the cable is of course an important consideration, in addition to factors discussed above. The incidence of lightning varies considerably over the country, and to take account of this factor, use has been made of data collected by the U. S. Weather Bureau over a period of 30 years. According to these data, the average number of thunderstorm days per year is as low as 5 in some parts of the coun-

(*Please turn to page* 90)

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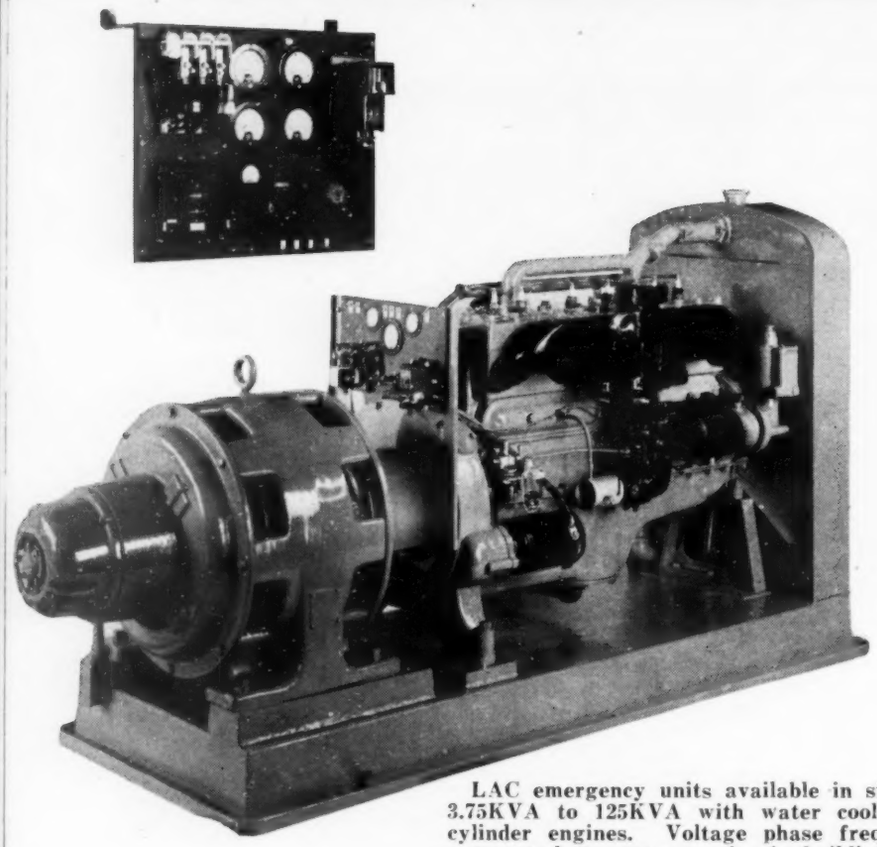

LAC emergency units available in sizes from 3.75KVA to 125KVA with water cooled multi-cylinder engines. Voltage phase frequency to correspond to power service in building.

Emergency Power Plants

by
F. F. McCLAIR

PROGRESSIVE telephone men take no chance on service interruptions. Auxiliary generator units insure continuous telephone service despite prolonged failure of commercial power.

General

UNLIKE MOST other businesses in a community, the telephone company has an obligation to maintain continuous and uninterrupted service at all times. The smooth and safe functioning of a community depends more than anything else on reliable communication. In times of emergency, telephone service is even more vital. In the first few hours after the disastrous Texas City blast, thousands of local and toll calls were handled. These were of great importance in expediting the rescue work and enabling the community to get back to normal in the shortest possible time.

Telephone service should have a continuous and uninterrupted source of primary power so that it can function day and night, week after week, even though the local power source may fail. Progressive telephone exchanges are taking no chances on being caught with their "plants down" and are installing emergency power plants. These auxiliary generator units insure continuous telephone service even though there may be a prolonged failure of the commercial power source.

Types of Emergency Units

EMERGENCY POWER equipment may consist of: (a) an engine driven direct current generator which can be used to keep the central office storage battery charged in the event of failure of the commercial power source, or (b) an engine driven alternator of the same frequency and voltage as the commercial power supply which can be connected to the building power panel in the event of failure of the commercial power supply.

Until recent years engine driven direct current generators have been somewhat more popular than alternators as the emergency power source. However, the present trend is toward engine driven alternators which can in an emergency take over, not only the charging of the central office storage battery, but also all or part of the lighting and miscellaneous load of the exchange building.

This latter method offers a more simple switching arrangement and greater convenience in that the lights and many electrical appliances found in the average exchange, such as soldering irons, fans, etc., can be used during an emergency period whereas this is not possible with the direct current generator type of auxiliary plant. This article deals with the alternating current type of emergency power plant.

Power Plant Capacity

ONE OF THE first considerations in planning an emergency power installation is the power requirements of the load to be served. Selection of the proper size alternator may be made on the basis of: (a) One having sufficient power capacity to handle the maximum a-c load of the exchange in the event of a commercial power failure. (b) One having only enough power to handle the equipment load and a limited number of lights.

Unless the load is so high as to make plan (a) impractical because of the size of the unit required, this method is preferable. A compromise between methods (a) and (b) may represent the most desirable combination from the standpoint of both convenience and economy. Such units as air-conditioning systems,

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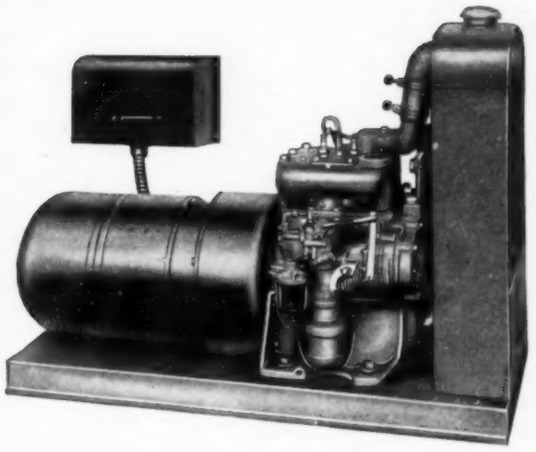

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with their large demand for power, electrical equipment in company cafeterias, elevators, etc. could be kept off the line during an emergency period and thus greatly reduce the size of the alternator required to supply the entire exchange building.

Available Sizes

GAS ENGINE plants are available in sizes ranging from 500 to 25,000 watts. For the average small or medium size office, a unit having a power output of from 1,000 to 5,000 watts with an air cooled engine, is generally adequate. For the larger offices requiring more than 5,000 watts, three-phase generators, driven by water-cooled gasoline type engines, are generally specified. A three-phase type generator is often required in the larger offices because of the use of three phase motors.

Table No. 1 lists the wattage, weight and other pertinent data with respect to the gasoline engine driven plants manufactured by one company. The list prices on units such as those shown in the table range from approximately $175.00 for the smallest to $2400.00 for the largest.

It will be noted that the wattage capacity rating is based on a load with a 100% power factor. Induction motors, charging equipment, fluorescent lights, etc. have a somewhat lower power factor which reduces the effective capacity of the generator.

The generators designed for the larger offices are of the *three-phase, four-wire type.* This type generator permits low voltage (110 volt) equipment such as lights, small motors, etc. to be operated off of a circuit consisting of one of the phase wires and the neutral wire; whereas, larger units such as three-phase motors operate off of the three-phase circuit. If the low voltage load exceeds 15% of the generator capacity, it should be divided equally between all three phases to insure proper balance of the currents in the three generator windings.

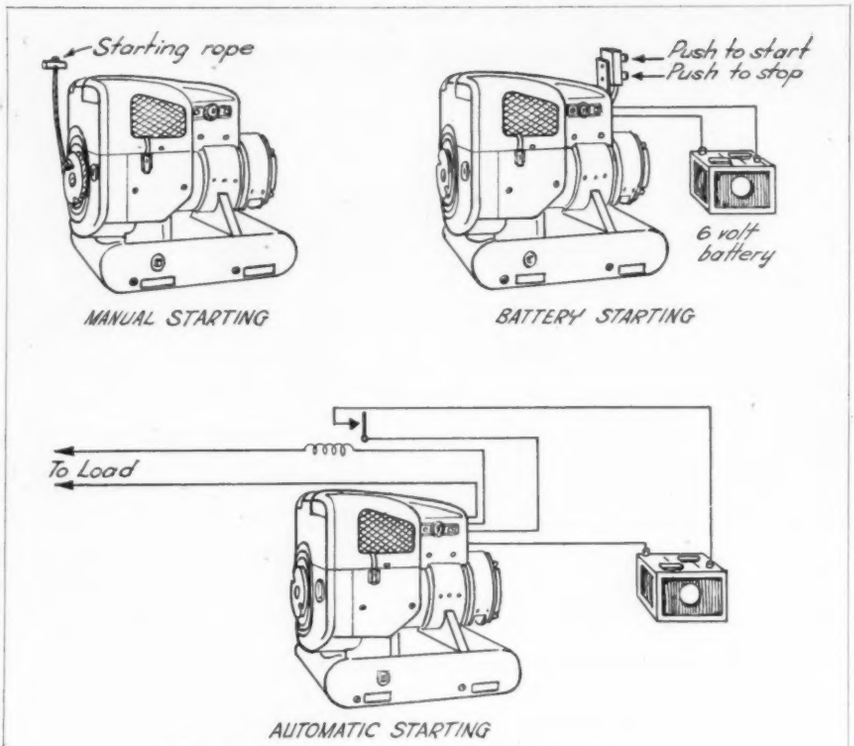


Fig. 2—The three starting arrangements.

Starting Arrangements

EMERGENCY power plants can be either *manually started,* that is with a crank or starting rope, or *battery starter.* If the unit is provided with a "battery start" arrangement, it can be made "automatic start" by means of relays. The three starting methods are illustrated in Fig. 2.

These automatically start the engine when the power failure occurs and switch the load from the commercial power mains to the emergency generator plant. If someone is always in attendance in the terminal room, the change over can be quickly made in the event of power failure with manual or push button "battery start", thus saving the cost of the automatic start arrangement.

If for noise reasons, it is desirable to keep the gas engine emergency plant remote from the terminal room, remote control equipment is available. It usually consists of a three-wire control cable with a start-stop button located in the terminal room and connected to the emergency plant.

Starting Circuit

THE SMALLER power plants (500 to 2000 watts capacity) are usually started by passing current from one or more storage batteries through the d-c exciting field. This causes the generator to run momentarily as a d-c motor. As soon as the engine starts, the exciter voltage, which is higher than the battery voltage, forces current back through the battery to keep it in a recharged condition. In other words, the battery floats across the d-c exciter output terminals when the plant is in operation.

Power plants with capacities above 2000 watts generally use engines similar to those used in automobiles, (i.e.,) the four or six cylinder, four-cycle, water cooled type. The starting arrangement consists of a six-volt battery and the usual automobile type starting motor.

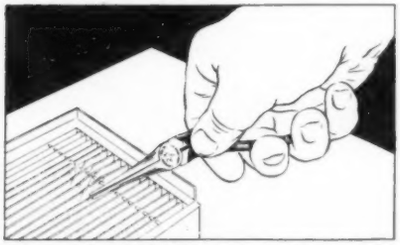
(*Please turn to page 86*)

Table No. 1—Data on Typical Gasoline Engine Driven A-C Power Plants

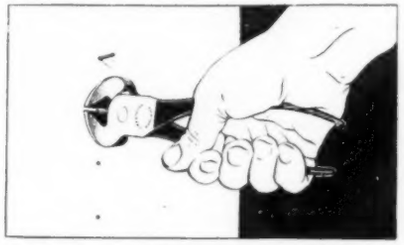
Watts Capacity	Number of Batteries Necessary for Self-Cranking	Cu. Ft.	Net Wt.	Ship Wt.	Phase
500 A-C	1-6V	5.2	135	170	Single Phase
600 A-C	2-6V	7.2	172	220	Single Phase
1,000 A-C	2-6V	12.8	265	295	Single Phase
1,500 A-C	3-6V	13.7	350	409	Single Phase
2,000 A-C	3-6V	13.7	360	450	Single Phase
5,000 A-C	(not self-cranking)	30	860	990	Single Phase
10,000 A-C	1-6V	47	1100	1300	Three Phase
15,000 A-C	1-6V	59.3	1300	1300	Three Phase
25,000 A-C	1-6V	64.2	2260	2475	Three Phase

Use Slip Joint pliers for round nuts, binding posts, etc., for which a wrench is not suitable.

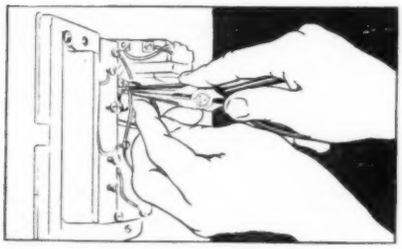
Use Curved Needle nose pliers for working in cramped qaurters where long needle nose pliers are not suitable.



Use Duck Bill pliers for working on flat springs, relays, metal tins, etc.,



Use End Cutting nippers where wires, nails, etc., must be cut off close to a flat surface.



Use Long Nose pliers for placing wires around binding posts, working with small objects in inoccessible places, etc,

Use Round Nose pliers for special wire work such as forming terminal loops etc.

Fig. 7—Use the correct plier for each job. One of the most useful pliers for light work is the long nose side cutting pliers.

can be used as a hammer, a pry, and for many other purposes. It should be considered a precision tool and used only as a *wrench*. It should be kept clean and well oiled. Dust or rust accumulations on the knurl or wrench head will make it difficult to use.

These wrenches are available in a variety of sizes and a tool kit should contain at least three standard sizes. Some workmen prefer the 4", 8" and 12" sizes. These wrenches are available in sizes up to 24". The larger sizes are useful in connection with heavy construction trucks. Fig. 1 shows the direction in which a crescent wrench should be operated to insure the strain comes on the wrench head at the proper point. The knurl should always be screwed

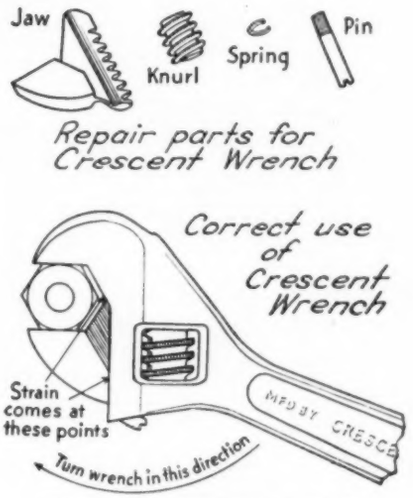


Fig. 1—The crescent wrench.

tight to insure the jaws are tightened firmly against the nut. This minimizes the possibility of the wrench slipping and damaging the nut, or injuring the user. The principal parts of the crescent wrench are shown in Fig. 1. Worn parts are available through the manufacturer and wrenches should be inspected periodically and repairs made.

The Screwdriver

THE SCREWDRIVER, like the wrench, comes in for much punishment in the hands of inexperienced workmen who feel that it makes an excellent chisel, punch, or pry. If workmen carry an adequate set of tools for all purposes, it is unnecessary to ruin them by using the wrong tool for a given job.

The screwdrivers in the workman's kit should range from a small size useful for set screws to the large drivers required for the in-

CORRECT Tool Usage

by

RICHARD ALLEN

IN THESE days of high labor costs management should see that every workman is equipped with an adequate set of good tools that are kept in proper condition. Timing tests have shown the unit cost of many operations may be more than doubled by the lack of proper kind and number of tools. The time required for certain plant operations can be shortened by a program of instructions on the correct use of tools and proper tool maintenance. The following notes on the use and care of various tools were inspired by a series of advertisements of the Crescent Tool Company of Jamestown, N. Y., manufacturers of the well known crescent wrench as well as many other tools. The editors are indebted to this company for the use of some of their illustrations.

"CRESCENT TYPE" wrenches probably are the most used and abused tool in common use. Many workmen feel that the crescent wrench is an all purpose tool that

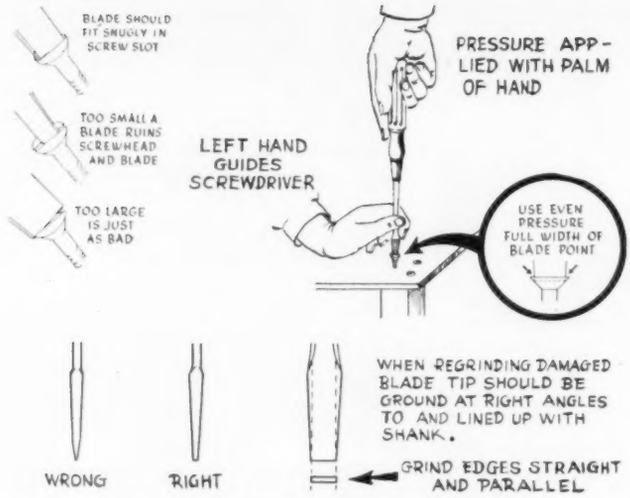

BLADE SHOULD FIT SNUGLY IN SCREW SLOT
TOO SMALL A BLADE RUINS SCREWHEAD AND BLADE
TOO LARGE IS JUST AS BAD
PRESSURE APPLIED WITH PALM OF HAND
LEFT HAND GUIDES SCREWDRIVER
USE EVEN PRESSURE FULL WIDTH OF BLADE POINT
WHEN REGRINDING DAMAGED BLADE TIP SHOULD BE GROUND AT RIGHT ANGLES TO AND LINED UP WITH SHANK.
WRONG
RIGHT
GRIND EDGES STRAIGHT AND PARALLEL

Fig. 2—Correct use of screwdriver.

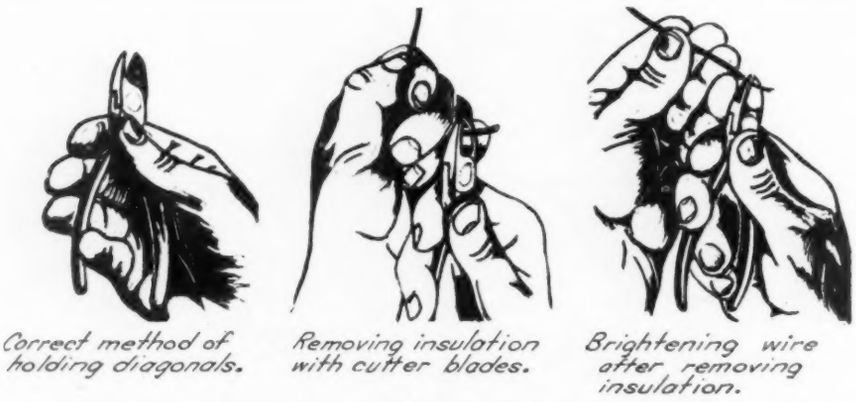

Correct method of holding diagonals.
Removing insulation with cutter blades.
Brightening wire after removing insulation.

Fig. 3—Use of diagonal pliers. Note that little finger is held against back side of the handle and the other handle is held securely in the palm of the hand.

stallation of knobs and screws. For work on central office equipment a narrow bladed, six or eight inch, cabinet type, screwdriver is useful. Screwdriver blades must be ground from time to time to keep them in proper condition. A common mistake is to grind the tip of the blade "chisel shape". This causes the blade to tend to slip out of the screw slot when used. The tip should always be ground at right angles to, and lined up with the shank, and the edges should be kept straight and parallel as shown in Fig. 2.

Care must be taken to avoid overheating and drawing the temper out of the blade when grinding it upon a motor driven stone. Overheating is indicated by the blade discoloring if it is held too long against the stone. The screwdriver should be held in such manner that pressure can be applied against the butt of the handle with the palm of the hand as shown in Fig. 2.

Pliers

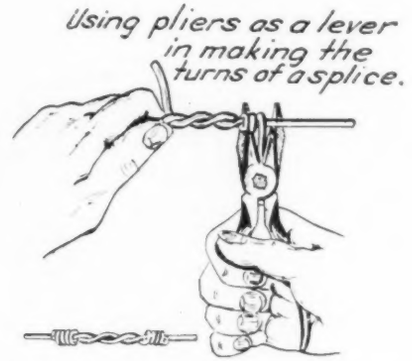
THE MOST useful pliers for telephone work are side cutters, diagonals and long nose pliers. Pliers should be kept well oiled with a fine penetrating oil to insure they will open and close easily. The knives should be kept sharp so that they will make a clean cut. As pliers become nicked and loose jointed new ones should be purchased as workmen are handicapped by the use of pliers which are badly worn.

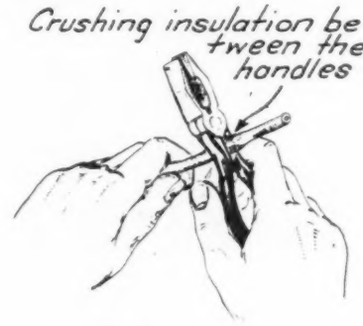
Fig. 3 illustrates how pliers can be held and controlled. It will be noted that the little finger is held against the back side of the handle and the other handle is held securely in the palm of the hand. By a slight outward pressure of the little finger the pliers can be opened, and the first, second and third fingers are used to close the pliers. It should be kept in mind that side cutting pliers are not bolt cutters and that their use should be confined to telephone line wire and single strands of guy wire. When cutting heavy guy wire, side cutting pliers can be used to make an indentation around the wire after which the wire is grasped with the nose of the pliers and bent sharply back and forth which will cause it to break. This is better than putting a severe strain on the pliers by trying to cut directly through the heavy wire.

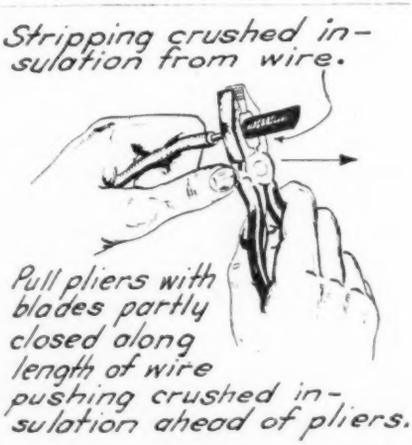
Fig. 4 shows how side cutting linesman's pliers can be used as a splicing tool in tightening up the end turns of a W. U. splice.

Use of Pliers to Remove Insulation

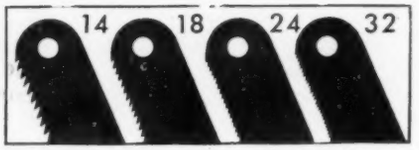
SIDE CUTTING pliers, diagonals and long nose pliers can be used to remove some types of insulation by crushing it between the handles at the point where they come close together. Fig. 5 shows how insulation can be crushed between the handles of a pair of side cutting pliers. Care must be taken to prevent bruising the wire when using this method. It cannot be used suc-






Stripping crushed insulation from wire.
Pull pliers with blades partly closed along length of wire pushing crushed insulation ahead of pliers.

Figures 4, 5, 6 (top to bottom) illustrate a few of the jobs that may be handled with pliers.



Choose correct blade for type of work. Blades with 18 teeth per inch best for general purposes.

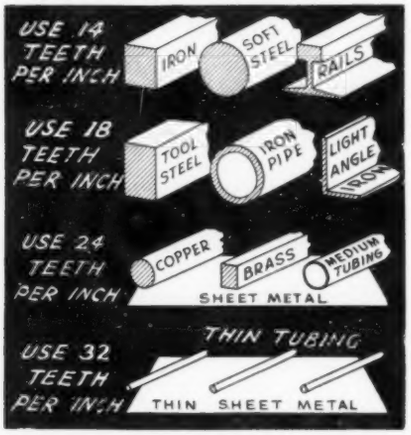


Fig. 10—Correct hacksaw blades for various jobs.

cessfully with some of the plastic coated wires.

After the insulation has been crushed it is readily removed by using the cutting blades in, a scraping action as shown in Fig. 6. Some wires can be neatly stripped by using diagonals to cut partly through the insulation which is then pulled off as shown in Fig. 3. The wire is grasped as shown in 3-A with the left hand. The jaws are closed sufficiently to just cut through the insulation. The counter pressure exerted by the inside fingers and the steadying action of the thumb control depth of cut. After the required length of insulation has been striped, clean the wire by drawing the cutting edges of the jaws carefully over the surface. This removes corrosion or pieces of insulation adhering to the wire. Trim off any frayed ends of the insulation.

Large (7 or 8 inch) diagonals are useful on heavy work, as for example, cutting off cotter keys and removing the key by gripping the head as shown and then prying sidewise. End cutting nippers are useful as shown in Fig. 7. These pliers make possible a flush cut and are useful for many other purposes.

Slip joint pliers are useful for general purposes and have excellent gripping power over a wide capacity range. They are not particularly handy for wire work and should be used primarily for mechanical jobs. Duckbill pliers are handy in connection with spring

something NEW in tool belts

"KLEIN-LINE" TOOL BELT

with the sliding trace

The "Klein Line" Tool Belt—new in design—provides increased comfort and convenience and a maximum factor of safety to the lineman.

The distinctive feature of this new belt is the Sliding Trace. Made of "Klein-Kord" (the same proved material used in our safety straps), the Sliding Trace is mounted on the cushion and carries the drop-forged tested single bar Dee rings. The trace slides freely through alloy steel guides, allowing movement of approximately 6 inches in either direction. Thus, the lineman is relieved of chafing often caused by conventional belts, and undue safety strap wear is prevented.

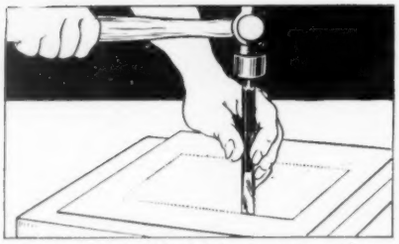
Other construction features of the new "Klein-Line" Belt include: 2-inch wide heavy harness leather belt strap with drop-forged buckle; 1-inch wide harness leather tool loop strap securely riveted to the main strap; and 4½-inch wide cushion of pliable latigo leather with rolled edges and canvas interlining. All sewing is lock stitched with hot waxed linen thread—all rivets solid copper hand set. Furnished complete with plier pocket, tape thong and knife snap.

Ask Your Supplier

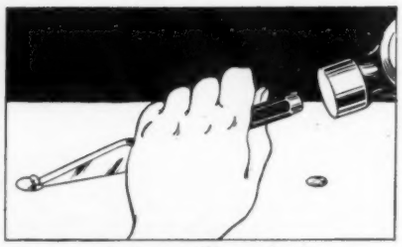
Foreign Distributor: International Standard Electric Corp., New York

A copy of the Klein Pocket Tool Guide, showing the Klein line and containing valuable tool information, will be sent on request.

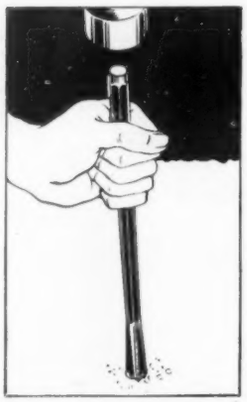
Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS



Use of Cold Chisel to cut sheet metal.



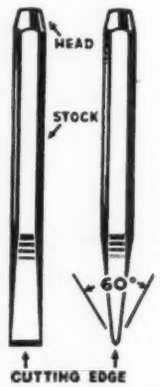
Use of Cape Chisel to remove rivet head. Cut through center first.



Correct method of holding Star Drill.

Chisel heads are purposely made softer than cutting edge to prevent chipping. When head becomes battered it should be ground off smooth to lessen danger from flying chips.

Using a punch that is too small causes rivet to bind in hole.



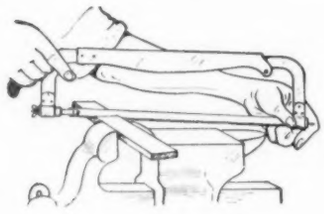
Correct bevel for Cold Chisel.

Fig. 8—Correct uses of cold chisel and star drill.

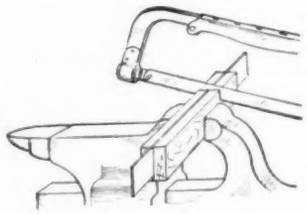
adjustment, straightening metal fins, etc. Curved needle nose pliers are not needed frequently but in some jobs they are indispensable. One of the most useful pliers for light work around terminals, switchboard equipment, etc. is the long nose side cutting pliers shown in Fig. 7.

The cost of chisels and punches is low and only high quality tools should be used. A good chisel has cutting edges which are hard tempered, hence, will hold up much longer than the cheap, dime store type of chisel. Chisel heads are purposely left soft to minimize their chipping under hammer blows. Cold chisels are designed to cut onlv metal *softer* than the tool itself. Do not attempt to cut drill rod, hacksaw blades, etc. with an ordinary chisel.

The burs which form on chisel heads from repeated use, should be ground off as they constitute a hazard due to the possibility of flying off and striking someone in the eye. Cold chisels are ground for average use so that the angle between the two beveled surfaces is 60° (See Fig. 8). Care must be taken to avoid overheating the point when regrinding, or the tool will lose its temper. When using a punch to drive out objects such as bolts, rivets etc. be sure the punch is almost the same size as the hole as a punch which is too small may wedge the end of the object being driven and cause it to seize.



Method of holding Hack Saw.



Use of vise and parallel board clamps on thin metal.

Fig. 9—Use of hack saw.

The Hacksaw

BEST RESULTS are obtained with a hacksaw when the object being cut is held rigidly in a vise or by some other means. When cutting thin stock, the stock should be clamped between boards and a cut made through the entire assembly (See Fig. 9). Best results are obtained when the maximum number of teeth are engaged in the work. Hacksaw blades are available in two general types: those hardened all over and those having only the teeth or the cutting edge hardened. The latter type have harder teeth and superior cutting qualities. Blades having 18 teeth per inch are best for all around service. For use with thin materials such as conduit, light angle iron, etc., blades having 24 teeth per inch are preferable. For thin sheet metal and light tubing a 32 tooth blade should be used. (See Fig. 10).

Fig. 11—Four styles of tin snips.

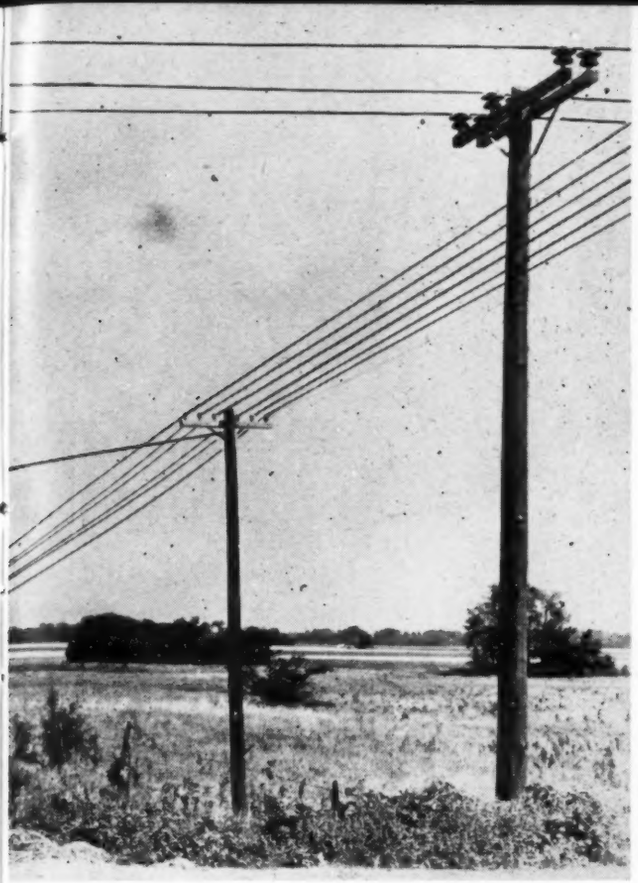
Inserting the Blade in the Frame

THE BLADE should be inserted in the frame with the teeth pointing away from the handle. The blade should be tightened so that it is perfectly rigid in the frame yet not tightened to the point where the frame is distorted. Blades usually break because of too much pressure being applied.

Cutting snips are used in cutting sheet metal, heavy cardboard, wire screen, etc. Snips are available in four different styles as shown in Fig. 11. The *standard* style is the most popular and is used when cutting on a straight line. The *combination* style will cut on curves as well as straight lines. The *circular* cutting pattern is useful for circles and scroll work involving intricate patterns. The *Heavy Duty* style is useful in the handling of exceptionally heavy metal.

Work to be cut should be carefully marked and cuts should be made with the cutting edge of the

(*Please turn to page 75*)



PRACTICAL --

"HOW TO DO IT"

SUGGESTIONS . . .

•

by

MYRLE SHAFER

•

DROP WIRE RUNS . . .

THE last attachment for a drop wire run is usually made as shown in Figure 1. A drip loop need not be formed if the entrance hole is made to slope upwards so that water cannot enter. If the hole cannot be bored in this manner, the drop wire should be attached as shown by the dotted lines in the illustrations and the drip loop formed as indicated.

• • •

VISUAL TRAINING AIDS

THE ARMY and Navy demonstrated during the last war the effectiveness of training films and projection slides for the training of skilled workers in war plants and for instructing the armed forces in various combat operations. The Bell System and some of the larger Independent Companies are now making extensive use of their public relations departments for entertainment at civic clubs, churches, etc.

Among the newer training films being used by the Bell are two which are titled "Step High" and "Big Day." These films are shown to the graduating classes of some of the larger high schools and the films are based on the advantages that acrue from employment with telephone companies. They show various phases of telephone work.

The Bell training films are carefully and expertly staged and have been particularly effective in connection with traffic department employee training. A newly developed, small sound film projector, known as the "Movie-Mite" can be used in operating rooms for training new employees without distracting the attention of those at the swithchboard as it can be used on a long table in conjunction with a small screen and without the necessity of darkening the room (See Fig. 1).

Independent companies should investigate the potentialities of training films both for employee training and for improving public relations.

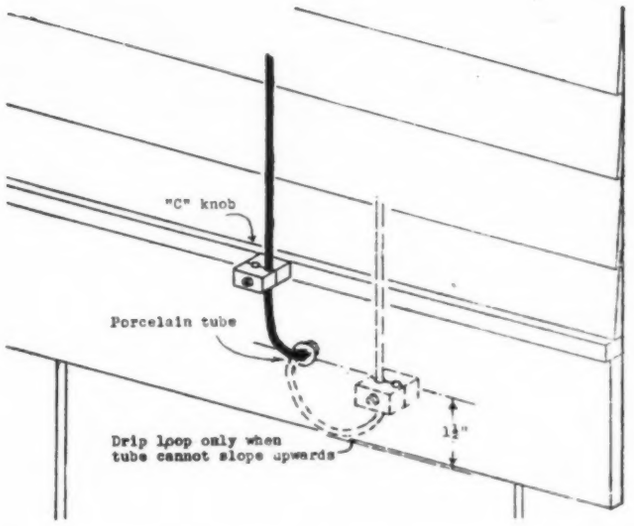
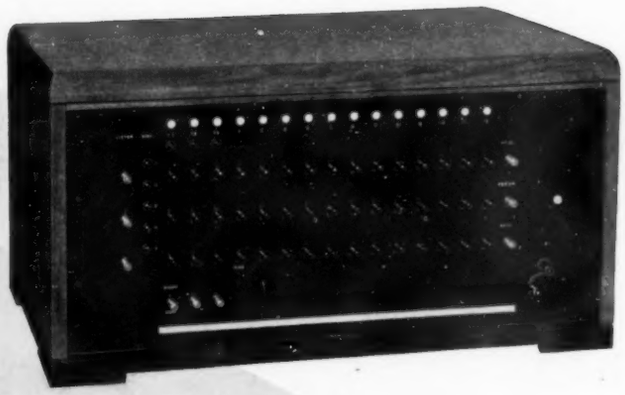


Fig. 1—Method of making last attachment of drop wire run on building.

CLEANING HOOK-SWITCH PLUNGERS . . .

FOR cleaning sticking plungers in a handset, a stiff-bristle brush will be found handy. A cloth swab moistened with a little carbon tetrachloride is also effective in removing the gummy deposit on the plunger. For cleaning contacts, a three eighths strip of hard finished paper may be used. The strip is inserted between the contact springs and then pulled out **once.** This is usually sufficient to bring away dirt and grease. If the work is done in the storeroom or the shop, it is better to use carbon tetrachloride and stiff-



IT'S WHAT'S IN

Sure, the attractive appearance and many operating features of the Leich Cordless PBX will make friends for you. But . . . the practical engineering behind it, and the honest good workmanship that goes into its manufacture are what will make money for you.

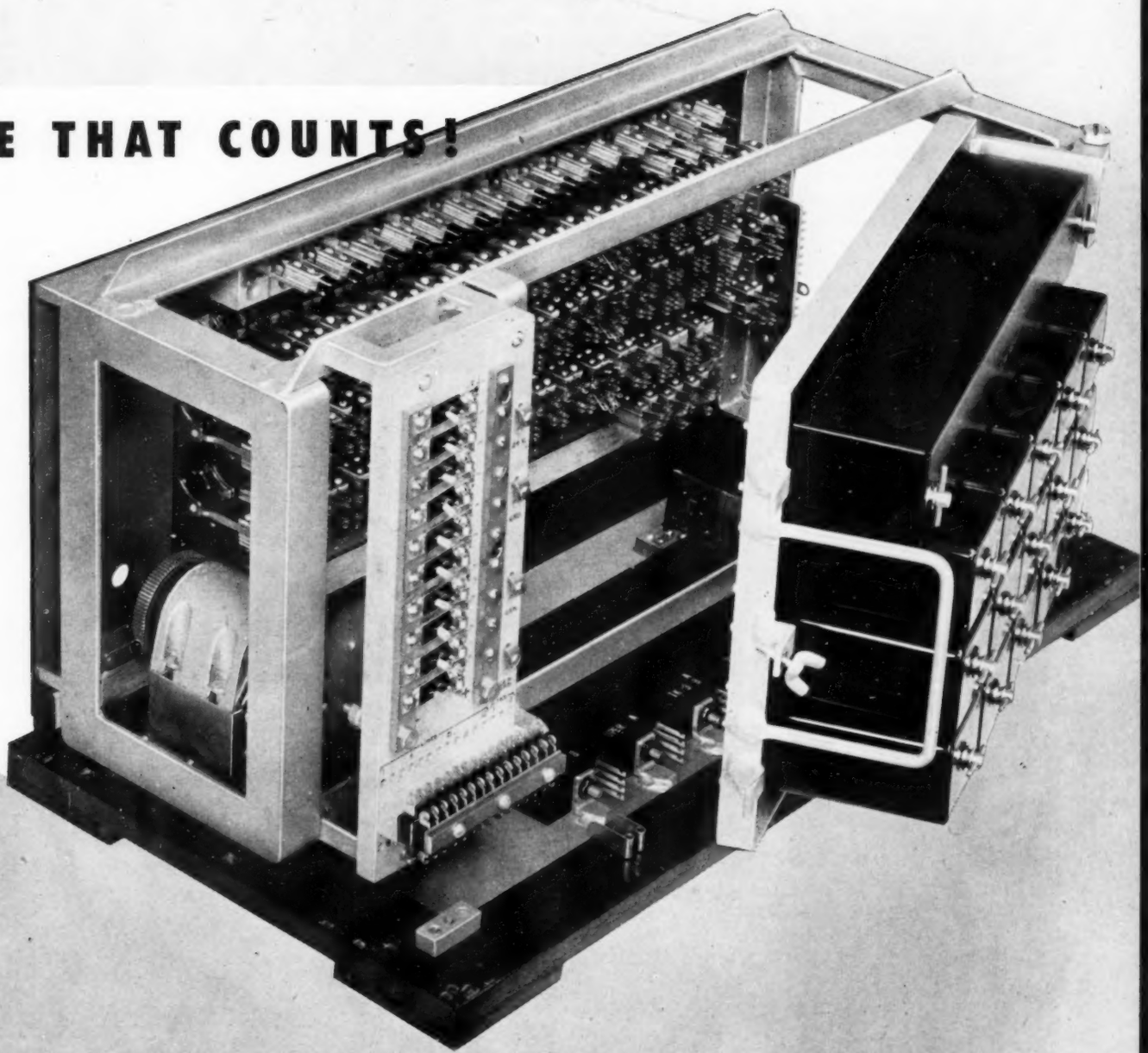
For, after all, faithful performance year in and year out . . . without any trouble calls or special maintenance trips are the things that pay out . . . that make your PBX installation profitable.

In a Leich Cordless PBX you'll find positive, long-wearing keys, reliable, job-proven relays, precise, neat wiring, sturdy, simple construction, carefully soldered connections . . . all reflecting sound engineering and experienced workmanship. One look at what's inside will clearly indicate a board built to serve long and well, to cut down costly maintenance and to make money for its owner.

Literature describing the complete line of Leich Cordless PBX Switchboards is now being prepared. If you would like to have us send you a copy as soon as it's completed, write Leich Sales Corporation, 427 West Randolph, Chicago 6, Illinois.

Leich Cordless PBX

T'S INSIDE THAT COUNTS!



LEICH MANUFACTURERS OF TELEPHONES, SWITCHBOARDS AND RELATED APPARATUS SINCE 1907

bristle brush for more effective cleaning. Care should be taken to keep the tetrachloride away from the spring pile up insulators.

• • •

USING LESS TIN IN CABLE JOINING . . .

ASK A CABLE splicer in what part of his work he takes the most pride and he will nearly always say "wiping joints." This means joining cables by soldering the ends of lead sleeves to the cable sheath. He enjoys this work because making joints that are gas-tight and present a finished appearance is a skilled operation performed with considerable artistry. It is an operation which in recent years has consumed millions of pounds of lead-tin alloy annually.

A new tight wipe or fillet joint meets the essential requirements for a wiped joint with far less solder.

The new cable joint is shown in Figure 1A compared with the former joint in 1B. In the making of Y-joints, not so large a proportion of the solder can be saved because of the difficulty of removing the excess material from the spaces between the cables. Even there, however, considerable savings can be realized.

The idea of wiping joints with a reduced amount of solder is not new.

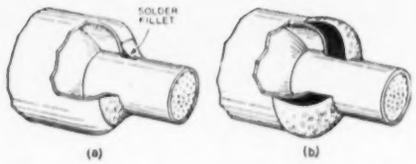


Fig. 1—New cable joint (a) which saves a large portion of the solder previously used as illustrated at (b).

An approach to this was made some time ago with satisfactory results. Recent work has carried the curtailment of solder much further, and to a point which appears to be about as far as is practicable.

Essentially, the new method consists of a careful beat-in of the sleeve ends to the proper shape to facilitate formation of a satisfactory fillet of solder and to obviate rounding out the sleeve ends with solder.

Tests of strength, resistance to fatigue, and gas-tightness show the new joints to be fully as good as the old. The wiping technique is somewhat simpler, and it is well liked by the splicing forces.

• • •

ONE-MAN ELECTRIC SAW . . .

LABOR SAVING tools continue to be of increasing interest to telephone construction executives as labor costs move upward. (One company recently testified in a rate case that its current labor costs were 145% higher than in 1940). Typical of new tools that depend on electric motors or gasoline engines to reduce labor requirements is the new one man electric chain saw. Weighing but 27 pounds this tool speeds up many operations 300 to 400 per cent.

It is particularly useful for extensive tree clearance operations and for use in the pole yard. Cuts can be taken at any angle and the saw is light enough that it can be used from a ladder. A unique feature of this saw is that it uses a three phase 180-cycle generator instead of the usual single phase 60-cycle type. This higher frequency power reduces the size of the driving motor (2½ h.p.) substantially.

• • •

THE RURAL LINE CARRIER SYSTEM . . .

INDEPENDENT companies will follow with interest the experimental results of two recent multichannel carrier current installations on rural and minor toll telephone lines in Minnesota. These installations are unique in that they make use of the new carrier system developed for use on rural power lines.

Fig. 2—Beating-in the ends of a cable sleeve in preparation for the new cable joint.

Fig. 3—Cable and sleeve are taped with paper to prevent the solder from spreading.

Fig. 4—Pouring the solder.

Fig. 5—Final wiping of the joint.

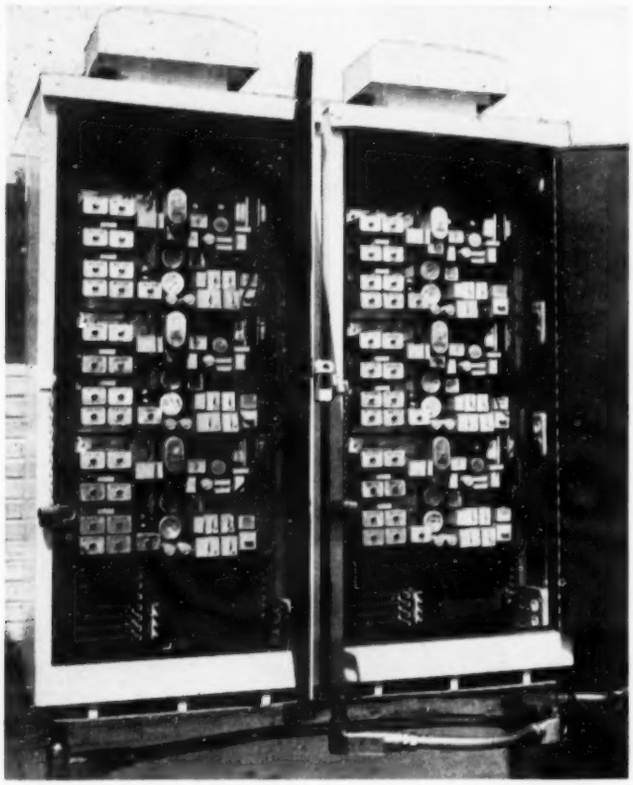


Fig. 1—Common terminal equipment for multi-channel rural telephone carrier system. (Courtesy Northwestern Bell Telephone Co.)

Two systems have been installed; one between Brainerd and Nisswa, and the other between Brainerd and Gulf Lake. These are both six-channel systems and will have a capacity of 96 subscribers based on a loading of eight subscribers per channel.

The maximum range of the carrier system appears to be about 30 miles over copper wire. It is interesting to note that these systems are being used to pick up approximately 80 held orders in the rural area which they serve. A minor toll circuit in one instance between two towns is used in one of the installations and ordinary rural line in the other.

Commenting on the installation, a Bell System magazine states essentially that: "While the installation at this time of the multi-channel rural line carrier system was found practical in the Minnesota application, it does not mean that this type of system is a cure-all for all rural problems. As a matter of fact, this type of equipment is generally more expensive than stringing wire to serve customers. It does, however, provide one more way in which customers can be reached who otherwise might not be served." The Minnesota equipment is designed to operate in either manual or dial areas. It is the amplitude modulated double-sideband type with a power output of approximately 0.9 of a watt. Each six-channel system operates in the frequency range of 155 to 450 kilocycles; the equipment being similar to that used on rural power lines.

LOW COST WORKING DRAWINGS . . .

THE COST of preparing working drawings for minor projects have substantially been reduced by a Texas company. Instead of turning the field inspection data over to the drafting department for preparation of linen tracing drawings, this company simply photostats that section of one of their regular plant maps covering the area in which work is to be done. A special **blank material list sheet** is photographed in across the top of the section of the map. The changes or additions to the plant are then drawn in using black ink. Additional photostats are then made in quantities sufficient to take care of the working forces. These maps are also convenient for use after the work is completed as it is easy to write on them.

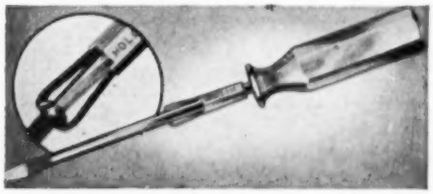
Most towns have commercial photostat service available so that if a company is not equipped for making their own prints, they can be obtained from the commercial firm.

• • •

HOLD-E-ZEE SCREWDRIVER HAS AUTOMATIC GRIP

THE "HOLD-E-ZEE" screwdriver, manufactured by Upson Bros., Inc., is proving popular in the telephone field.

Blades of the "Hold-E-Zee" screwdrivers are of finest chrome vanadium



"Hold-E-Zee" Screwdriver

hexagon steel, tempered entire length for toughness and springiness.

Spring action gripper holds, starts and sets up screws in unhandy places, and the spring steel fingers hold tightly with instant release. The gripper automatically slides out of way, giving full use as a regular screwdriver.

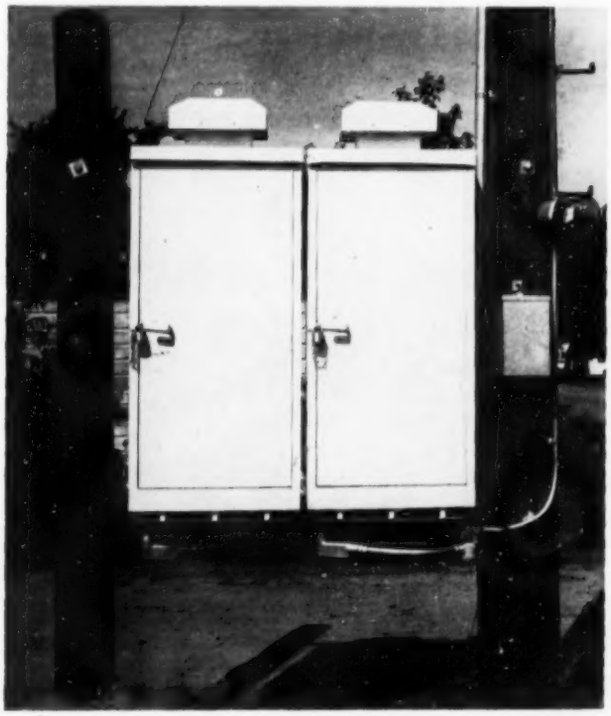
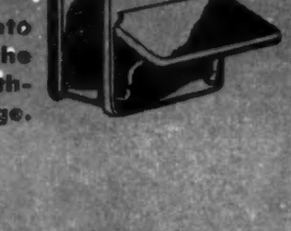


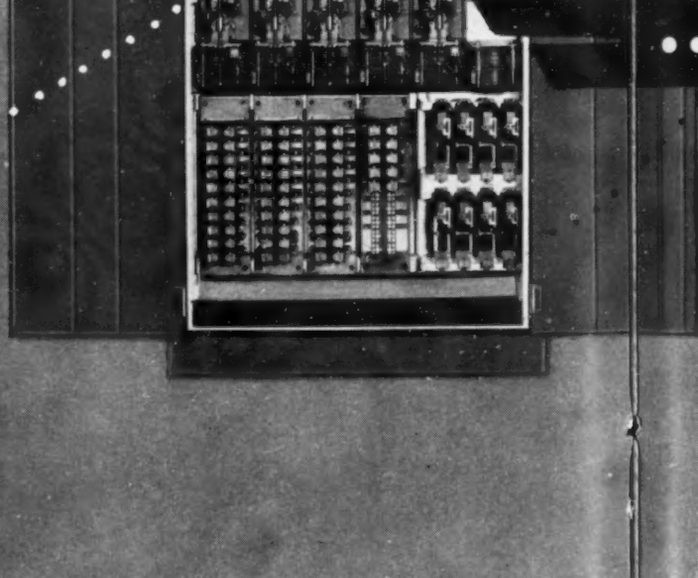
Fig. 2—Method of mounting common terminal units for rural telephone carrier system. (Courtesy Northwestern Bell Telephone Co.)

"Switcher"



this telephone

• and other magneto telephones now on the line, are used without change.



. . . and this R-C-X switchboard

• its automatic equipment replaces the local operator!

R-C-X

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...lines ...a problem for you?

Automatic Electric . . . R-C-X

(Remote-Controlled Exchange)

● Even if your magneto exchange is serving "switcher" lines which cannot be converted to automatic operation—even if you can't improve these lines or change the telephone instruments—don't resign yourself to the high operating cost of manual equipment. You can still secure much of the economy of automatic operation, by replacing your magneto switchboard with the Automatic Electric R-C-X (Remote-Controlled Exchange).

R-C-X eliminates local operating expense —usually the biggest expense in a magneto exchange. Yet it requires no change in telephones or outside plant, and subscribers continue to "ring in," just as before. Instead of ringing a local operator, the subscriber's call now goes to the R-C-X. From the R-C-X it is automatically switched over a control trunk to an operator in a "control" exchange—usually a larger exchange in a nearby town.

When the subscriber's signal flashes in the control exchange, the control operator asks for the desired number. She then dials the number back over the same control trunk to the R-C-X, where the desired connection is automatically completed. The control trunk is then cleared for another call.

...can solve your problem

● Automatic Electric R-C-X will save many dollars in operating costs—earn many dollars with its modern, efficient service. R-C-X operation is as simple as it sounds—and just as inexpensive. In most instances the amount of traffic originated in small exchanges can be handled by the control exchange without additional labor. Operator service, too, is improved because operators at the control exchange usually have no extra-office duties to perform.

R-C-X will serve metallic, grounded, simplex or carrier circuits which are operated on a ring-down basis. Full 24-hour service can be supplied in areas which now receive only limited service. With these and its other advantages, Automatic Electric R-C-X is recommended wherever "switcher" lines prevent full automatic operation.

Find out for yourself what R-C-X can do for you. Tell us your specific problem; Automatic Electric engineers will be glad to supply complete information on R-C-X equipment to meet your requirements.

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UTOMATIC ELECTRIC CORPORATION

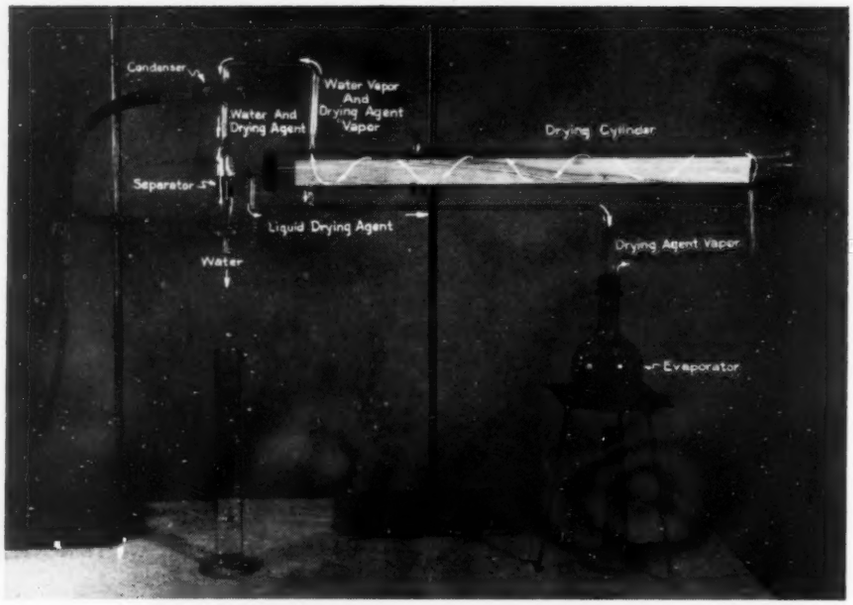


Fig. 1—Laboratory model of Vapor Drying principle. Water distilled from green wood condensed, separated and discharged; condensed drying agent returns to evaporator for recirculation.

★

By

MONIE S. HUDSON

Chemist, Taylor-Colquitt Co.,

Spartanburg, S. C.

(Courtesy Electrical World)

★

Poles Seasoned Quickly

in HYDROCARBON Atmosphere

PART ONE of a two section series explaining how new step in preservation process greatly shortens period for drying poles preparatory to impregnation —Wide variety of inexpensive distillates available —Details of the new procedure.

A NEW PROCESS for quickly preparing wood for preservative treatment eliminates the strength reduction of the order of 20 percent reported for Southern Pine timber prepared for preservative treatment by current methods of practice.

Pole users were more or less alarmed by the findings of Buckman who made a study of the effect of steaming on the strength of Southern Yellow Pine, and Richards who worked on the effect of so-called yard seasoning fungi on strength values of this timber.

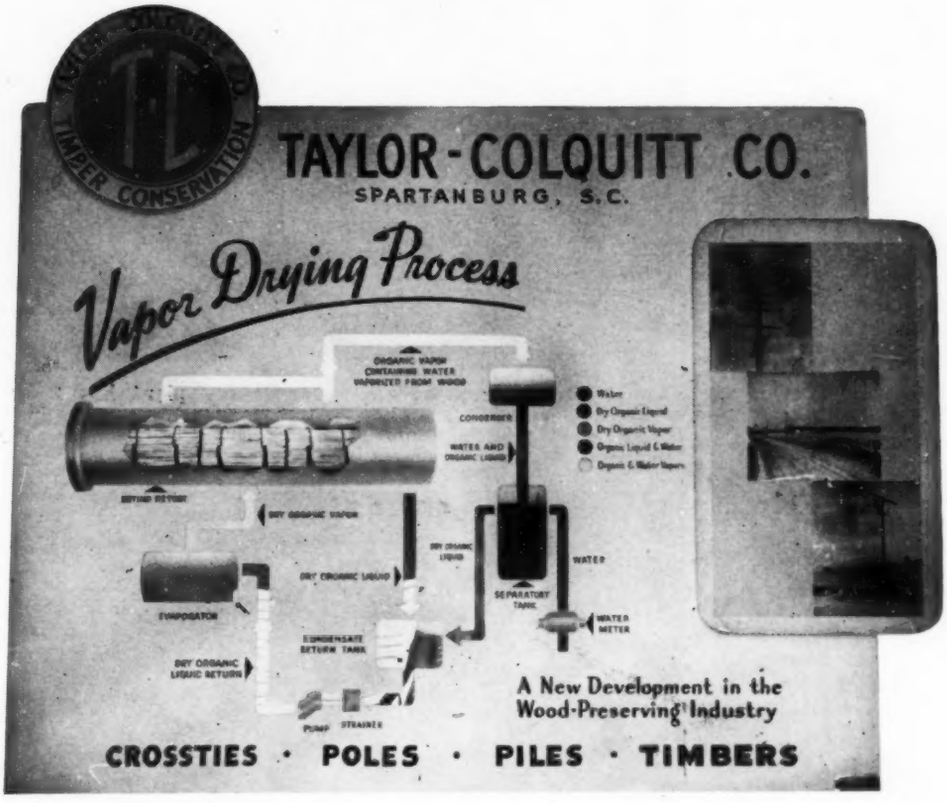
The new process which has been given the name Vapor Drying is a development of the Research Laboratory of Taylor-Colquitt Co. at Spartanburg, S. C.

Spurred on by the impetus given research in timber drying by the reports of Buckman and Richards a number of companies in the wood preserving industry inaugurated research projects aimed at overcoming the strength reductions reported. For the most part these efforts were limited to the adaptation of existing methods of drying wood to the drying of poles. Departing from this conventional line of attack the inventor of the Vapor Drying Process directed his efforts toward development of a method whereby the timber could be dried not only without impairing the strength but also without requiring the long drying cycles that are inherent limitations of low temperature processes like kiln drying.

Since high temperature is one of the prime requisites for rapid drying, this worker recognized that by some means it would be necessary to utilize high temperature but without incurring the generally accepted penalties of its use; viz, strength loss and other detrimental effects. From critical examination of the effects of high temperature drying he concluded that injury to the wood was not produced purely from thermal action but was the result of the chemical action of the oxygen and water that have ever been present and disregarded in efforts made toward drying at high temperature.

Heat Transfer Rate

RECOGNITION of this fact immediately indicated, as one of


TAYLOR-COLQUITT CO.
SPARTANBURG, S.C.
Vapor Drying Process
A New Development in the Wood-Preserving Industry
CROSSTIES · POLES · PILES · TIMBERS

You are cordially invited to inspect

our Animated Illuminated Display

describing our

"New Vapor Drying Process"

for conditioning

Southern Yellow Pine Poles

in Room 507, Stevens Hotel,

Chicago, October 14 - 15 - 16

TAYLOR-COLQUITT CO.

Representatives of our company will be on hand to answer any questions.

the adjuncts of high temperature of drying, exclusion of these substances from the presence of the wood while it was at high temperature, which suggested an operation carried out in an inert atmosphere such as nitrogen or carbon dioxide. However, examination of the heat transfer rates obtainable with such fixed gases even at high temperature indicated that rather long drying periods would still be required to remove the large quantities of water present in green wood even when very rapid circulation of the gases was employed. Immersion in inert liquids such as creosote while heating was also considered but discarded because of the low rates of heat transfer characteristic of such heating and other objectionable features such as the high retention of preservative that occurs when the timber is dried while submerged.

At this point after examination of existing information on heat transfer to wood in drying revealed that the highest rates were obtained with steam it was concluded that the answer to the problem of rapid high temperature drying probably lay in the use of a condensing vapor to obtain the highest heat transfer rate, and one which at the same time would not attack the wood at high temperatures as does steam. Acting on this premise it was found that wood could be dried at very high temperatures without detrimental effects by exposing it to vapors of a large number of organic compounds such as hydrocarbons, alcohols, ethers, etc.

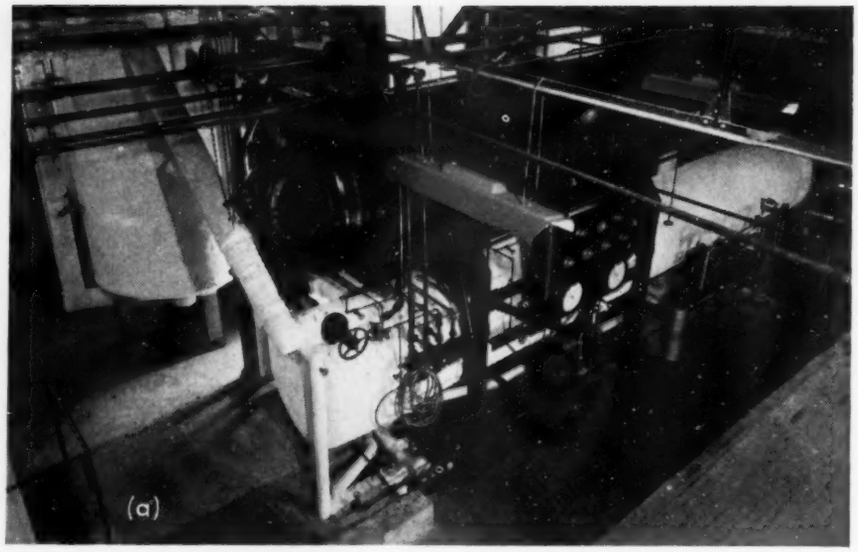
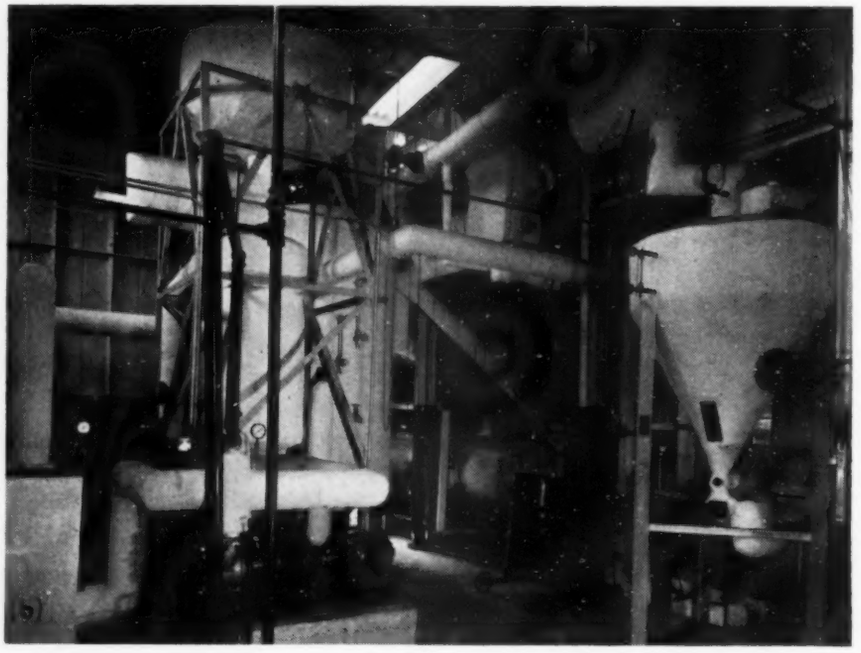


Fig. 2—Semi-commercial vapor drying plant has 26- x 3-ft. cylinder mounted on scales. (a) Rueping tank on top, evaporator in left background. (b) Inclined pipe is vapor discharge line to condenser near roof trusses; separator is cone-shaped vessel at extreme right.



Principle of the Process

AT THIS stage in the development of the Vapor Drying Process experiments were carried out in the laboratory (Fig. 1). The drying agent in the spherical flask is boiled by applying heat to the flask and the vapor from the boiling liquid is led into the long cylindrical vessel containing the wood to be dried. The hot vapor envelopes the wood and heats it causing the water that it contains to be vaporized. As rapidly as the water is vaporized it is displaced from the cylinder by the flow of incoming drying agent vapor which transports it to the condenser shown above the cylinder at the left.

The condensate formed by cooling the mixture of drying agent and water vapor passes downward into the cigar-shaped separator where the water settles to the bottom. The drying agent overlying the water returns to the boiling flask through the line connecting these vessels, along with any drying agent that has condensed in the cylinder. The water is removed at intervals through the stop cock at the bottom of the separator.

Throughout the period of heating in vapor the system is under atmospheric pressure being vented to the atmosphere through the open line on the upper left side of the separator. Although the system is open to the atmosphere at this point, the presence of air in contact with the highly heated wood which would cause injury by oxidation is effectually prevented by the barrier of drying agent vapor that fills the system up to the condenser. The vapor of most of the substances used as drying agents is five to ten times heavier than air so that the air is completely displaced from the system.

The only water vapor present in the system is that being vaporized from the wood and since the density relation between water vapor and drying agent is approximately the same as that between air and drying agent the water vapor is displaced from the cylinder as rapidly as it forms. This action is further promoted by the active flow of drying agent through the system which sweeps the vaporized water along to the condenser. In this manner the wood is protected from the two chief offenders which attack wood when it is subjected to high temperatures, viz, air which produces de-

generative chemical changes in the cellulose and lignin by oxidation, and steam which produces these changes through the chemical reaction with these wood constituents that is known as hydrolysis.

Pilot Plant

AFTER TESTS in this laboratory equipment had demonstrated the workability of the process a small pilot plant was constructed. Among the substances included in the glassware stage tests to determine which were suitable as drying agents were a number of the lower boiling fractions from coal tar creosote that showed themselves to be well suited for the purpose, and since the finished product would contain creosote these fractions were used in the small pilot plant for determining optimum temperature range for drying, drying rates, treatability of the wood after drying, etc. In these tests it was found that the fractions boiling in the temperature range between 212 deg. F and 400 deg F gave very rapid drying without injuring the wood and subsequent impregnation yielded excellent penetration and distribution of preservative.

Semi-Commercial Plant

IN 1942 A semi-commercial pilot plant equipped for operation of both vapor drying and pressure impregnation in the same cylinder was erected based on design data obtained in operation of the small unit. The cylinder which is 26 ft. in length by 3 ft. in diameter has associated with it complete facilities for vapor drying as well as the latest in equipment for operating any type of impregnation procedure.

Over a period of three years the new process was rigorously tested on various species of wood including soft woods such as Southern Pine, Douglas Fir and Western Hemlock, and hardwoods such as Oak, Gum, Beech, Birch, Maple and Hickory; in the form of poles, piling, crossties and bridge timbers. From the start the results of these tests showel conclusively that high temperature drying could be successfully operated when carried out in the presence of organic substances in vapor phase that were inert with respect to chemical attack on the wood.

TO BE CONTINUED

Continue this article by Mr. Hudson in the next issue of Telephone Engineer and Management.

Endurance in Telephone Wires means *Economy*

Neoprene Means Endurance Plus!

Neoprene jacketed drop wires are a proven superior product, and will greatly increase life of your installations.

NEOPRENE has:

- **Greater abrasion resistance**
- **Best weathering characteristics in all climates**
- **Freedom from fraying and rot**
- **Flexibility at all temperatures**
- **Very high tensile strength**
- **Positive resistance to oil and chemicals**

Parallel Drop Wire

Twisted Pair Drop Wire

OUTSIDE WIRES—Drop, bridle and free—sizes 14 to 20—B&S, bronze, copper and iron conductors, rubber insulated, cotton braided.

INSIDE WIRES—Sizes 19 and 22—B&S with rubber insulation, cotton braided or plastic insulated.

Samples of Neoprene drop and bridle wire are available—wire or write today.

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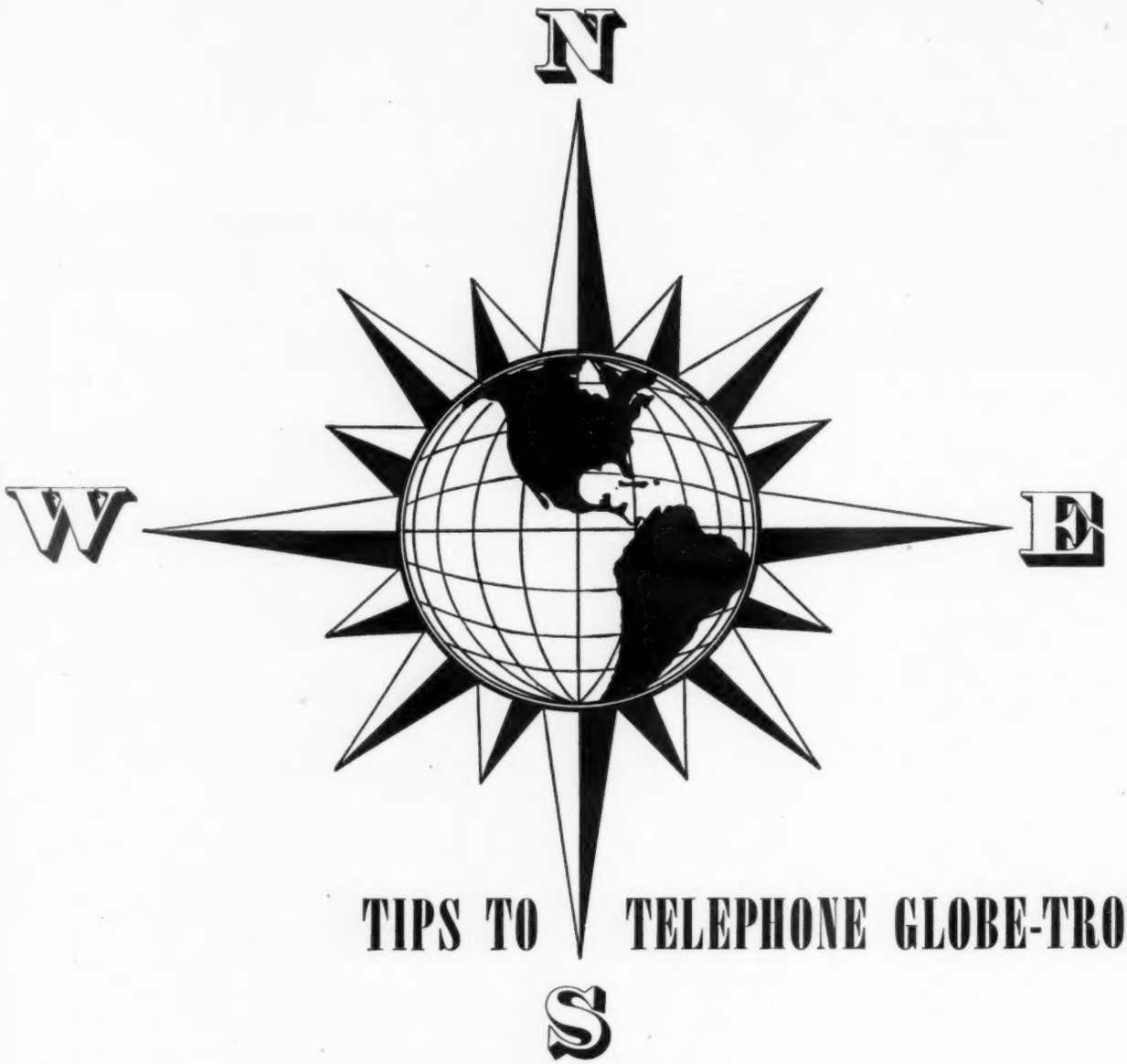


TIPS TO TELEPHONE GLOBE-TROTTERS

With wartime restrictions lifted, Overseas Telephone Service is reaching out to more and more countries. Today you can "travel" to almost any one – almost anywhere – by telephone.

The series of national magazine advertisements on the opposite page tells interesting facts about some of the countries you can call. It also shows how far the telephone industry is going to make the telephone more useful to more people.

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM

Telephone

PORTUGAL

WITH AN AREA OF ABOUT 34,000 SQUARE MILES PORTUGAL IS SLIGHTLY LARGER THAN MAINE. IT HAS A POPULATION OF 8,000,000.

SCENIC SAMPLER--A COUNTRY OF UNUSUAL VARIETY AND BEAUTY PORTUGAL HAS ALPINE MOUNTAINS, FLOWER-COVERED MOORS, HUGE SAND DUNES, PICTURESQUE HARBORS, CANALS AND WATERWAYS, AND TERRACED RIVER-BANK VINEYARDS.

STOPPER--PORTUGAL IS THE WORLD'S LARGEST PRODUCER AND EXPORTER OF CORK. THE BARK OF THE CORK OAK TREE, CORK PLANTINGS COVER **MORE THAN 1,300,000 ACRES.**

GLOBE GIRDLERS--BEFORE 1550, PORTUGUESE MARINERS HAD VENTURED AS FAR AS **BRAZIL, CHINA, JAPAN, GREENLAND, INDIA, SUEZ, CEYLON.** MAGELLAN, A PORTUGUESE, HAD SAILED **AROUND THE WORLD!**

...TUGAL GAVE THE ... A MIXTURE OF GRAPE **NAMED AFTER OPORTO,** ...WHICH IT IS SHIPPED.

...AL and the principal countries and territories of the ...ow be reached from your own telephone. And new low ...effect. A 3-minute conversation between the U. S. and ...costs $12 on weekdays; $9 on Sundays.

OVERSEAS Telephone Service

Telephone Tours

CHINA

CHINA IS THE WORLD'S **OLDEST CONTINUOUS CIVILIZATION.** ITS AREA--4,480,992 SQUARE MILES--IS GREATER THAN ALL OF THE UNITED STATES AND ITS TERRITORIES. CHINA HAS 1/5 THE WORLD'S POPULATION--ABOUT 450,000,000 PEOPLE.

NO TRESPASSING--CHINA'S **GREAT WALL** COMPLETED IN 210 B.C. TO KEEP OUT THE NORTHERN BARBARIANS, **MARCHES 1400 MILES** INLAND FROM THE SEA. IT AVERAGES 20 FEET HIGH, CLIMBS MOUNTAINS, CROSSES RIVERS.

"VENETIAN TRAVELER"--IN HIS FAMOUS JOURNAL, MARCO POLO REPORTED ON CHINA'S WEALTH AND CUSTOMS. RECEIVED BY **EMPEROR KHUBLAI KHAN** IN 1275, HE SERVED HIM FOR SEVENTEEN YEARS.

IMPERIAL CITY--PEIPING (PEKING) IS ARCHITECTURALLY ONE OF THE WORLD'S OUTSTANDING CITIES. MANY OF ITS MAGNIFICENT **PALACES** AND **TEMPLES**, BUILT BY THE EMPEROR YUNG LO, DATE BACK TO THE 15TH CENTURY.

AGELESS ART--CHINESE PAINTINGS, DONE IN INK ON SILKEN SCROLLS, ARE FAMED FOR THEIR **DELICATE BEAUTY.** AT PAINTING, SCULPTURE, POTTERY, THE CHINESE HAVE **EXCELLED FOR 1500 YEARS!**

NATIVE NECTAR--THE TEA PLANT IN CHINA--ITS BIRTHPLACE--**PRACTICALLY WITHOUT CULTIVATION.** FROM SMALL PATCHES COME MANY VARIETIES FOR EXPORT THE WORLD.

You can call China — and most of the principal cou... the world — right from your telephone. New low rates a... effect. You can talk to China for 3 minutes from any p... U. S. A. for only $12 on week-days and $9 on Sunday...

Bell System OVERSEAS Telephone Servi...

Telephone Tours

VIRGIN ISLANDS

THE VIRGIN ISLANDS OF THE U.S. ARE SOME 1500 MILES SOUTHEAST OF NEW YORK. AREA ABOUT 133 SQ. MILES. POPULATION ABOUT 25,000.

DEFENSE KEY--THE U.S. BOUGHT THE VIRGIN ISLANDS FROM DENMARK IN 1917 BECAUSE OF **THEIR STRATEGIC LOCATION** AT THE APPROACHES TO THE PANAMA CANAL AND THE CARIBBEAN.

BUCCANEERS' HAVEN--DURING THE 17TH CENTURY, HENRY MORGAN AND OTHER NOTED OLD BUCCANEERS USED THE VIRGIN ISLANDS AS A **HIDEOUT AND REST HAVEN** BETWEEN FORA...

SWEET LAN... ONE OF ...

☆ *Advances in the Industry*

New Telephone Ideas

BY MYRLE SHAFER

Aluminum Cross Arms

The use of aluminum cross arms on recent power line projects in the Northwest, raises the question as to their possible use in the telephone field. The arms used in power line construction are 36 feet long and are made of two structural aluminum channels. The two channels are laid back to back and bolted together to provide the necessary strength. Because of their light weight, the aluminum arm has proven popular with linemen.

Aluminum cross arms were used, not because of any price advantage over wood arms, but rather because both wood and steel are critical at this time. But line constructors felt that the experience gained in the use of aluminum cross arms may warrant their use in future construction. The tremendous tonage capacity of aluminum plants, as compared to prewar, will, after the present sellers market has passed, undoubtedly result in aluminum being substituted for wood and steel in many instances. One company is just getting into production on 109 mil aluminum wire for farm telephone line use. Ladders, car tops, tools, and boats are typical of other items now being made out of a metal that once sold for $40.00 a pound.

General Emergency Plan

As a result of extensive research by the Bell System and the Edison Electrical Institute, principles have been set up and outlined in a paper titled "Mutual Assistance in General Emergency Situations Affecting Both Power and Telephone Service." This paper establishes the principles of jointly meeting such emergencies as floods, sleet storms, hurricanes, fires, etc. which affect both telephone and power service. It is designed to encourage the utility companies in every community to get together and work out in detail, plans which can quickly be pressed into service when an emergency develops. The paper is available through the Edison Electrical Institute, 420 Lexington Ave., New York 17, N. Y.

Telephone Television

The Zenith Radio Corporation has recently announced a new system of television in which the local telephone company may play a "key" part. The new system has as its primary purpose, the dissemination of top flight television entertainment to "pay-as-you-see" customers. With this new system, customers would be provided with a special "phone vision" receiver which would operate either on the ordinary "free" type television program or on the "pay-as-you-see" program.

The television transmitting station would send out two sets of frequencies. One set would contain the bulk (wide band) of the television picture frequencies and would be radiated from the station antenna in the usual manner. Other key frequencies would be sent to the television subscriber receiver over a special telephone pair (or possibly over the subscriber's regular telephone line). The two sets of special frequencies would combine in the television receiver to give perfect picture reception.

But without the "key frequencies" available only over the telephone wire circuit, the resulting picture would be distorted and worthless.

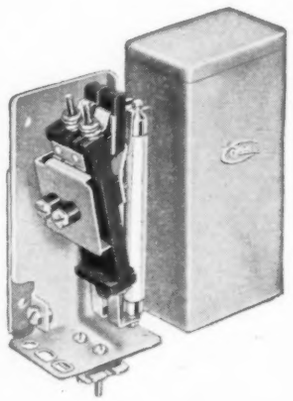
Thus it appears that telephone companies may have two opportunities to fit into the television picture, i.e., (1) by handling television program material over inter-city coaxial cable, and (2) by furnishing the circuit for the key frequencies which would "unlock" the television program at the receiving end.

STROMBERG–C

cook type RO

outdoor sub-station protector

A very rugged Protector, assembled on a bracket of heavy steel—instead of porcelain—to take rough handling and subscriber abuse without danger of breakage. Other outstanding features:



1. Uses a Cook Standard Type H Protector unit with molded bakelite base for high resistance to electrical and physical shocks.
2. Protector unit contains both primary and secondary arresters. The secondary arrester provides a path to ground for lightning should the fuses be blown.
3. Mountings contain heavy studs for connecting drop wires and ground.
4. Equipped with heavy zinc weatherproof hood, and bracket for mounting on post, wall, etc.
5. All structural parts, including hood and bracket, are grounded.

STROMBERG–C

BRANCH OFFICES: CHICAGO 6, KANSAS

RG—CARLSON Recommends

build for permanence and economy *with poles bearing this trade-mark*

The T. J. Moss Tie Company's creosoted southern yellow pine poles are time-proven.

Every pole is full-length pressure-treated in accordance with American Wood Preservers' Association specifications.

MTCo

The Stamp of Character

FOUNDED 1879

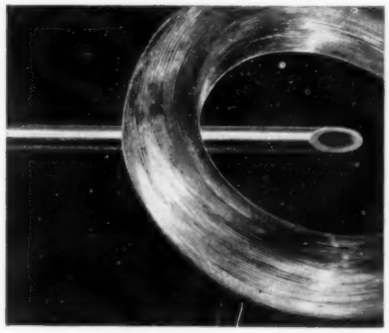
long life telephone dry cells

"Eveready" "Columbia" "Gray Label"

Higher sustained voltage . . . longer life . . . rock-bottom economy—these qualities are assured through the constant supervision of America's largest dry battery laboratory.

Made by the makers of the famous "Eveready" "Air Cell" Operators' Transmitter Batteries.

THE QUALITY CELL PREFERRED BY TELEPHONE ENGINEERS



copperweld wire

means greater strength
conductivity
permanence

Copperweld provides every desirable feature in telephone wire—the high strength of alloy steel, combined with the high conductivity and better transmission of a thick, protective covering of copper permanently molten-welded on.

This means that long spans are perfectly safe, and maintenance costs are reduced to a minimum.

Copperweld has the best electrical conductance of any high-strength conductor—is 2 to 3 times stronger than hard-drawn copper wire, and has greater tensile strength than any wire of comparable electrical properties.

For long life and long spans, specify Copperweld . . . the wire that gets the message through!

RG—CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

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STROMBERG Telephone CARLSON

Mutual Advanced Telephone Field Equipment *SAVE* man hours

Melt lead and compounds this modern and efficient way . . . with the use of Liquid Gas Equipment

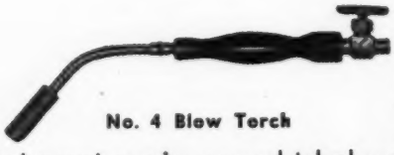
THOUSANDS of satisfied users of Mutual equipment will verify its ability to do the job to be done faster, more economically and at the same time be free from expensive Maintenance costs.

Now with production stoppages of the past eliminated, Mutual is able to make prompt delivery of its complete line of equipment.

NO. 2 FURNACE is a compact, light-weight unit that saves time and money on the job. It will melt 8" pot of lead in twelve minutes. Its many features include: non-warping head, adjustable orifice and tube, removable handle and shield. Shield will accommodate 8" lead pot. This furnace may be used on Mutual No. 11 or No. 21 cylinders. Either propane or butane may be used. Cylinders are built to I.C.C. 4B 240 code; 250 lb. w.p.; fitted with vapor and filler valves, 375 lb. pressure relief valve and liquid level valve. Furnace develops approximately 2350 degrees.

Mutual Liquid Gas Torches

The Mutual line of torches (using butane or propane liquid gas) has been designed to fit the definite needs of linemen, installers and maintenance men. Mutual torches are rugged, but light, and easy to handle . . . light instantly and will not blow out. Efficient and economical, they develop a pointed flame of approximately 2300°F.



No. 4 Blow Torch

Telephone men find Mutual's No. 4 Blow Torch an ideal tool for the following uses: Soldering joints in line and bridle wire at junction poles, etc.; For minor soldering operations on subscribers' premises; for field use in connection with instrument repairs on rural telephones; for heating threaded crossarm bolts, guy clamps, which are so badly corroded that nuts cannot be readily removed; for smoothing up wiped cable sleeves or removing solder from sleeves and many other such operations. Other Mutual Torches are available that will save time and labor on heavier brazing jobs such as repairs to company vehicles, digging tools, etc. Write TODAY for Mutual's illustrated catalog.

Order from Your Jobber or Direct

MUTUAL LIQUID GAS EQUIPMENT CO., Inc.

3600 WEST IMPERIAL HIGHWAY • INGLEWOOD, CALIFORNIA

"MEGGER"* INSULATION TESTER

*T. M. REG. U. S. PAT. OFF.

Whether in central office or out on the system, your "Megger" Insulation Tester is an unfailing detector of weakened insulation.

Simply turn the hand crank to generate 500 volts D.C. Read insulation resistance by pointer deflection. Always ready for use any time . . . anywhere . . . the new U. S. model in rugged plastic case weighs but 8 pounds. Telephone model has guard terminal and capacitance discharge switch. Write for Bulletin 1735-TE—today.

James G. BIDDLE CO.
ELECTRICAL & SCIENTIFIC INSTRUMENTS
1316 ARCH STREET • PHILADELPHIA 7, PENNA.

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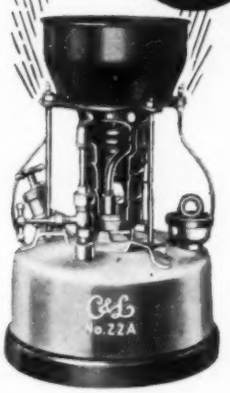
for *Peak Performance!*

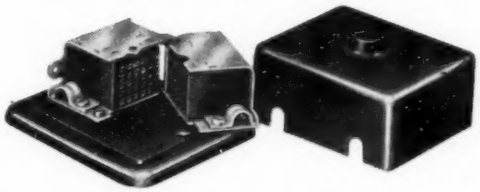
use C&L TRADE MARK **FIRE POTS and BLOW TORCHES**



Making repairs when time is important calls for tools that give smooth, dependable performance. Delays on the job can be costly. That's why so many thousands of skilled mechanics prefer C&L Fire Pots and Blow Torches. These experience-proven heat tools are built for heavy service and long life. For the finest in heat tools, specify C&L Fire Pots and Blow Torches.

Sold by leading jobbers.

CLAYTON & LAMBERT MFG. CO.
1709 DIXIE HIGHWAY • LOUISVILLE 10, KENTUCKY



T.F.A. MULTI CONTACT SET

The Multi-Contact set may be used in any conceivable combination.

In its most complete form the set has two cable straps and cover. To connect cable, remove strap and the insulating cover opposite the hinge, and the unit slides out.

In its simplest form the set is unequipped with cable strap, and is intended for placing on a rack or similar equipment.

There are several conceivable combinations in which the Multi-Contact Set may be used.

For Complete Information Write

TELEFON FABRIK AUTOMATIC A/S
Amaliegade 7, Copenhagen

INVEST YOUR "PIN MONEY" IN THE BEST

LOCUST PINS

Locust wood is practically impervious to decay and is impenetrable to moisture. Because of its close-grained hardness locust can be machined into strong, long lasting pins of standard specifications that can be counted on to retain their size and shape.

OAK BRACKETS

Oak pole brackets of unquestioned quality are in demand now as never before in the face of the qualifications necessary in the equipment and materials needed today to "keep 'em talking." Present day maintenance and repair have every reason to demand and get only the best.

GLASS INSULATORS

Research and experiment have produced in Hemingray insulators a glass insulator that is better than any ever before offered.

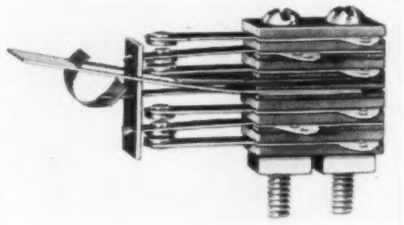
Non-porous, non-deteriorating, uniform coefficient of expansion and high mechanical as well as high dielectric strength are some of the many qualities that rank Hemingray the "best on the line."

BUCKEYE TELEPHONE and SUPPLY CO.
COLUMBUS 6, OHIO

NEW PRODUCTS' SHOWCASE

ACRO Electric Develops 2-Pole Open Blade Switch

The ACRO Electric Co. has developed a new, compact snap-action open blade switch for 2-pole applications. The switch is constructed with the patented Beryllium Rolling Spring, and



Acro 2-pole open blade switch

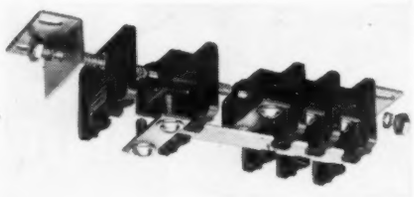
made with both single and double throw contacts. Standard operating pressures are from 3 to 5 ounces. The unit is furnished with terminals, as illustrated, or at the rear. The overall dimensions are only 2⅞" x 25/32" x ⅜". Rated at 15 amps., 125 volts AC the switch has a movement differential of approximately 1/16". For further information write, New Products Editor, Telephone Engineer Publications.

◆

New Build-Up Terminal Block Kit

A new terminal block kit expressly designed for experimental work and maintenance operations was introduced recently by the Curtis Development & Manufacturing Company.

In a bulletin just prepared by this firm, a description of the kit, termed



Curtis "Type B" Terminal Block Kit.

their "Type 'B'", discloses that any number of terminals, from one to 14, can be quickly and inexpensively produced. These terminal blocks are similar to factory built blocks and are claimed to be equally substantial.

This individual "build up" feature is uniquely suited for electrical engineers and others doing experimental work who need "one of a kind" parts or parts in small quantities for their projects. To repair and maintenance people, too, this block's flexibility should prove excellent for replacement purposes, and a great time saver.

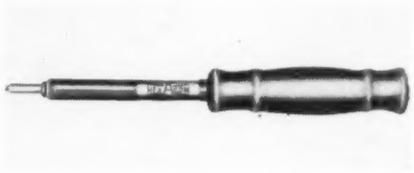
All parts necessary to assemble a wide assortment of terminal blocks, according to this bulletin, are provided in these kits. Kit No. 200 contains necessary molded sections, terminals and screw assemblies, and Kit No. 201 has a balanced supply of end brackets, partitions, threaded rods, screws, nuts and washers. Thus, with the correct ratio of these kits, all sizes of blocks may be built, meeting specific requirements easily and quickly. Complete instructions are included with each package. The blocks are recommended for installations where the temperature does not exceed 400 degrees Fahrenheit.

Complete information on this Type "B" Build-Up Terminal Block Kit may be had by obtaining Bulletin DS-118 from New Products' Editor, Telephone Engineer Publications.

◆

New Hexacon Instrument Soldering Iron

Hexacon Electric Company (124) W. Clay Avenue, Roselle Park, New Jersey, have announced the addition to its line of a new electric soldering



Hexacon instrument soldering iron

iron, especially suitable for very fine soldering of instruments, electric appliances, radios, etc.

This iron can be furnished with ⅛" or ¼" diameter tip and in 40, 50, or 60 watts. It is very light in weight, works off regular 110 or 220 volt line circuit, direct or A.C. current, any cycle. No transformer or other cumbersome and expensive equipment required.

The iron is equipped with a 6 foot, 10,000 cycle, approved heater cord (covered with twine braid for extra long wear) and shatter-proof rubber plug. Heating elements are of best grade nickel-chromium resistance wire, insulated with finest grade mica. User can replace element with ease. Tips are hard drawn copper; simple to remove. Terminals are accessible and designed to relieve cord strain. The cool, smooth, comfortable handle is also removable. Each iron is furnished with a stand.

Designed as Catalog No. P-30, list price $4.50. Delivery can be made immediately in either tip size, or any of the wattages listed.

◆

New Hammer With Aluminum Alloy Tips

An important new improvement has been made in the KANT-MAR hammer, one of a line of Schmidgall Products.

Tips of the Kant-Mar are made of a precision turned special aluminum alloy called "Velv-Alum," easily replaceable after hard wear. The manufacturer states Velv-Alum is a new material sufficiently tough to take punishment, yet is soft enough so as not to mar the most delicate surfaces encountered in the tool room. Velv-Alum also reduces the chance of eye

New "Kant-Mar" Hammer

injury due to chipping, and the Kant-Mar is perfectly balanced to practically end rebound accidents.

The handle is of selected grade hickory. Head has an oval hole (not round), for handle, eliminates loose handles and the consequent danger of injury. The Kant-Mar is made in two sizes, for light and heavy duty; 8 and 32 oz., in a plain model (non-replaceable tips), and in the same sizes in a model with replaceable tips. Additional 8 and 32 oz. tips may be obtained separately. Full details and prices may be had by writing New Products Editor, TELEPHONE ENGINEER Publications.

Safe Handling for Acids and Liquids

A safe and sane method of acid handling is provided by a manually-operated acid pump, supplied by General Scientific Equipment Company, which is finding wide usage wherever liquid must be removed from a carboy, drum or barrel.

Corrosive and other liquids flow smoothly and stop instantly, they come in contact only with the corrosion-resis-

New pneumatic acid pump

HUBBARD

HOLD THAT LINE!

with HUBBARD

- Brackets
- Anchors and Rods
- Braces
- Nuts—Washers
- Cross Arm Bolts
- Guy Clamps
- Eye Bolts—Hubeye
- Guy Hooks
- Strain Plates
- Ground Rods
- Cable Racks
- Drive Hooks
- Pins and Cobs

Hubbard Pole Line Hardware will stand the gaff. You can install it and forget it as far as time and weather are concerned. Every piece of Hubbard Pole Line Hardware is made from new, open-hearth steel or certified malleable iron—double-dipped in molten zinc for a dense, non-porous time and weather-resisting surface. Every one of the hundreds of pole line items that bear the Hubbard trade-mark is recognized as standard equipment in every branch of the Industry. You can be sure of the best when you specify Hubbard.

New Rounded Corner Crossarm Braces

All Hubbard flat steel crossarm braces are now furnished with rounded corners. This change in design will be a very welcome one to linemen, who heretofore have had to contend with sharp cornered braces which caught on clothing and equipment. All Hubbard steel crossarm braces are protected from corrosion by Hubbard double-dipped, non-porous hot galvanizing.

RECOMMENDED AND DISTRIBUTED BY

AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET · CHICAGO 7, ILLINOIS

tant tube and cannot affect other parts. When the pump is removed, acid drains completely. No tilting of the container is necessary and danger of a slip, a splash or a spill is minimized. Damage likely to result when other methods are used can easily exceed the small cost of the pump.

General Scientific pneumatic acid pumps are supplied in hand- or foot-operated models. Either can be equipped with a lead tube for sulphuric, hydrochloric, hydrofluoric and similar acids.

◆

New Bruning Drawing Set Has Many Unusual Features

New features and advantages are embodied in an industrial drawing set just introduced by Charles Bruning Company, Inc.

The instruments in the set consist of Beam Compass with 8-inch and 13-inch beams—a 6-inch giant Bow

New Bruno Drawing Set

Compass—Ruling Pen with club style wood handle and Draftsman's Refillable Pencil that can be converted into a double point pencil.

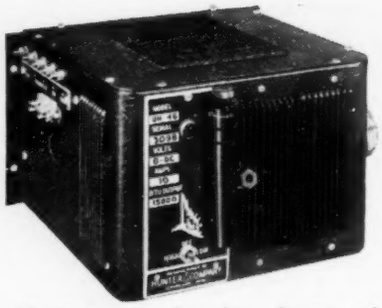
An exclusive patented feature of the Bruning Beam Compass is a rapid, simple and positive adjustment of the needle and pencil blocks on the beam. A slight pressure of the thumb on the tension spring of the blocks allows the needle and pencil blocks to move freely and smoothly on the beam—yet release of pressure locks the needle and pencil firmly in desired position.

A new patented feature of the Ruling Pen is the calibrated adjusting collet that enables the user to regulate the opening of the nibs and at the same time record the desired setting for future use. With this patented device, the desired width of line, when indexed, can easily be duplicated by re-setting the pen.

◆

Gas Burning Heater For Truck Cabs

Hunter and Company have announced a new fully automatic gaso-



Hunter gas burning heater for truck cabs.

line burning heater for the heating and ventilation of truck cabs and small busses.

The compact heater, having a "Sealed-in-Steel" flame, is 7" x 10" x 10" in size and operates independently of the engine. It is spark ignited and thermostatically controlled maintaining desired temperatures in cold weather. Fresh air is supplied by an air inlet tube that runs from the heater to the radiator grille.

The new heater is installed in the cab exactly as a hot water heater and can be equipped to operate while the engine is not running, making it ideal for engine preheating as well as overnight storage in cold weather. For further information write New Products' Editor, Telephone Engineer Publication.

◆

Sturgis Announces New Operator's Chairs

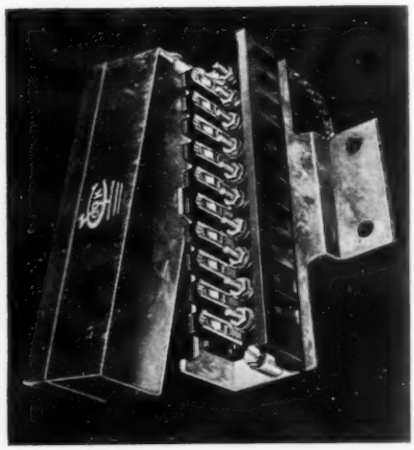
The Sturgis Posture Chair Company has just designed and placed on the market through the Stromberg-Carl-

Sturgis supervisor chair

STROMBERG-C

cook type 7

high-potential lightning arrester



Outdoor pole type arrester provides lightning protection and atmospheric static drain for five pairs of open-wire circuits, or for drop wires and cables leading to unprotected terminals.

Equipped with:

1. Single piece molded Bakelite insulation and fanning strip for strength and high resistance. Fanning strip is closed with a thin film of Bakelite until drops are run.
2. Non-corrosive metal hood, Everdur studs and galvanized mounting bracket for long service life.
3. Phosphor-bronze spring clips to accommodate Cook Tru-Gap non-grounding lightning dischargers.

STROMBERG-C

BRANCH OFFICES: CHICAGO 6 ANSAS

RG-CARLSON Recommends

reliable station ground clamps

• • • for all telephone, radio and signal circuit station grounds. Design principles of this clamp are field-proved to maintain high pressure contact and maximum conductivity to joint.

Station Ground Clamps are adjustable for grounding to water pipe

"RELIABLE" IDENTIFIES THE QUALITY

hold that line . . . *with* chance *steel expanding anchors!*

The Chance unbreakable Steel Expanding Anchor has a larger percent of its total area in solid earth than any other expanding anchor. Before you specify new anchors, check these outstanding Chance features:

- Rigid construction of tough, heavy-ribbed steel eliminates possibility of breakage.
- Blades rigidly fastened to expanding arms and grooved to conform to ridges in housing and base plate for accurate expansion.
- Expansion in opposite directions, assuring equal distribution of pull and eliminating side twisting.
- Drop forged steel driving head.
- Patented destructible nut retainer aids installation by preventing anchor from riding up rod. Rods can be salvaged or driven down if anchor is abandoned.
- Easy installation in any position, at any angle.
- Lifetime endurance with maximum strength for top economy.

crapo galvanized strand

Guy and Messenger

LONG LIFE — LOW COST

The superior tensile properties inherent in steel are used to full advantage in *Crapo* Galvanized Strand. The tightly adherent zinc coating applied by the *Crapo* Galvanizing Process provides lasting protection against corrosion, prolongs the life of the strand. Controlled ductility makes *Crapo* Strand easy to work and to serve. Low first cost and low yearly cost result in important economies.

The all-round dependability of *Crapo* Galvanized Steel Strand is being demonstrated constantly by its outstanding performance in service. There is a size and grade for all practical needs.

RG-CARLSON FACTORY, GENERAL OFFICES: ROCHESTER 3, N. Y.

GO 6. SANSAS CITY 8. SAN FRANCISCO 3. IN CANADA: STROMBERG-CARLSON COMPANY LTD. TORONTO

STROMBERG Telephone CARLSON

No. 622F posture chair

son Company, exclusive distributor to the Independent telephone trade, five new model chairs. These include a supervisor's chair and both high and low base operator's chairs.

They are designed and built by chair specialists with built-in features for all day long comfort. The firm-flex back rest is a new development—truly a new experience. It is firm, but gives to every body movement, allowing the comfort of softness with firm support. The steel parts of all Sturgis telephone operator's chairs are bonderized and a modern infra-red oven makes the best finish better.

New easy back and seat adjustments, made in less than 60 seconds without the use of tools, will be welcomed by all telephone people.

Exhausting tests have scientifically determined the proper shapes and sizes of the seats and backs. The use of these new chairs leaves operators more rested at the end of the day, adding much to their health and well being.

◆

Associated Research Develops New Precision Ohmmeter

Associated Research Inc., has recently announced the Model 246 Ohmmeter. This instrument was designed to fill a specific need in precision ohmmeter. It contains a long lasting ample power supply, is a sturdy instrument, ruggedly built, easy to handle and insures extraordinary accuracy.

The qualities of this instrument are obtained through the use of: precision wire wound resistors, individual calibration, unusually long (4½ inch) hand stepped scale, superior workmanship by specialists in the field of instrumentation.

A sturdy metal wrinkle finished case with cover to protect the instrument also holds the two No. 6 dry cells which provide ample power supply with long life. Overall dimensions are 7¾" x 6" x 7 13/16".

The manufacturer states the instrument is ideal for checking accurately resistors as low as one ohm and up to

Model 246 Ohmmeter

100,000 ohms on four overlapping scales of 0-100 ohms, 0-1000 ohms, 0-10,000 ohms, and 0-100,000 ohms.

For more complete information write New Products Editor, TELEPHONE ENGINEER Publications.

◆

Single-Sideband Power Line Carrier System

The first modern single-sideband, suppressed carrier, powerline communication system has recently been delivered to the Pacific Power & Light Company by the Westinghouse Electric Corporation. To be used between Portland, Oregon and Pasco, Washington, it is now in service for the power company.

Transmitting on a nominal frequency of 91.4 kilocycles, the equipment was tested between Pasco and Spokane, a distance of 149 miles. Under adverse conditions, including a measured carrier channel attenuation of about 60 decibels and an interfering signal of several volts that was less than 10 kilocycles from the mid-sideband frequency, it maintained throughout the tests clear, understandable voice communication, superior to that obtained on many wire telephone circuits. The equipment delivered consistent signals through a variety of line switching conditions.

These excellent results are possible with the new-type equipment because the entire power output of the transmitter can be used to amplify and transmit the components of the single-sideband. The carrier wave is suppressed. At the receiver end of the channel an oscillator produces the equivalent of the carrier wave with a minimum of power.

Major advantage of the single-sideband over the common AM double-side-band or FM carrier is that it utilizes a waveband less than half the width of that formerly required. This makes it possible to increase materially the number of channels in a given frequency range. Since the power-line carrier band is only from 50 to 150 kilocycles the added available channels are a considerable advantage, especially in crowded areas.

While the equipment installed at the Pacific Power & Light Co. is a complete single-sideband power-line carrier communication system, certain components of it are designed and put together in the form of a converter unit that will convert common AM carrier systems of proper design into single-sideband.

◆

New Series of Unbreakable File Handles

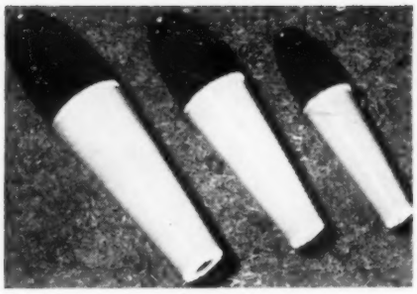
Safety engineers know of the many accidents that have occurred through the use of files not equipped with handles. The pointed end is a dangerous thing to grip at best, but when used in lathe filing or in conjunction with power tools, can lead to serious injury. In the past wooden handles have been used, but the result has been anything but satisfactory. They loosen up and will not stay on the file, ven when driven on or "burnt" in. They also have the disadvantage of splitting and becoming grease laden.

With the above in mind, the Ross-Frederick Corporation has designed and are manufacturing a new handle to overcome these obstacles, made of Celanese "Celcon". The new handles are absolutely non-breakable; they can be driven onto a file with no effort and they will not come off of their own accord. When the file is worn, the handle can be driven off and re-used on a new file.

It is claimed the life of these new handles is many, many times greater than those made of wood. They are

NEW PRODUCT INFORMATION

To receive additional information on any of the new products reviewed in this section write NEW PRODUCTS' Editor, Telephone Engineer Publications.



Unbreakable File Handles

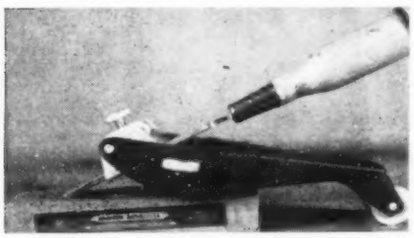
grease resistant and non-inflammable. Made in a brilliant color combination of yellow and blue, they can be easily picked out of a tool box or drawer by sighting instantly.

Handles are made in three sizes—large, medium and small. For further information write New Products' Editor, Telephone Engineer Publications.

◆

McLaren Industries Present New Honing Device

McLaren Industries, Inc., have recently put on the market a sharpening device to be used in conjunction with a whet stone for sharpening plane irons, chisels and scrapers. This little tool acts as a guide for controlling the angle of the outlining edge when grinding, as well as grinding the blade square. The



New Honing Device

angle of the cutting edge desired is acquired by turning a micromatic adjusting nut. Broader angle ranges are obtained by placing wooden pads either under the stone or under roller of the device and adjusting the micromatic nut. It is claimed that nicked blades can be put in cutting condition very quickly without fear of burning the stone. For additional information write New Products' Editor, Telephone Engineer Publications.

◆

"Kano Kroil" Creeps Into Millionth Inch Spaces

As a result of new chemical discoveries it is now possible to loosen frozen bolts, nuts, pipe threads and other corroded metal joints that formerly resisted all efforts.

The manufacturers of Kano Kroil have made laboratory tests which show that the product will pass through openings as small as a millionth of an inch. Its action is to dissolve the rust, dried grease and gummed oils and provide lubrication which permits the parts to be separated without damage.

During the war several thousand industrial concerns used Kroil to maintain equipment for defense production. Thousands of man hours were saved by Kroil wherever a frozen joint threatened production. In a miraculous way it loosened the frozen joint in a few minutes time and allowed the equipment to be put back to work.

One manufacturer reports that after trying for a month to find a suitable material to loosen the bolts on heat treat quench trolleys he tried Kroil. Prior to using Kroil they broke off every nut. Since using it they have not lost one and have reduced the repairing time from thirty minutes to six minutes per trolley.

Kano Kroil is manufactured by the Kano Laboratories. For more information, write, New Products' Editor, Telephone Engineer Publications.

"Give me strength!"

"'Gone!' moaned the boss. 'The folder on advertising I've been getting together for the past two months! All the things I wanted to talk to Loomis about at the Convention! Gone! Vanished! Spirited away and probably destroyed! Oh, give me strength!'"

"Well . . . it WAS important . . . for with costs up all along the line that extra advertising revenue Loomis produces through consistent market development was going to be as welcome as the flowers in May.

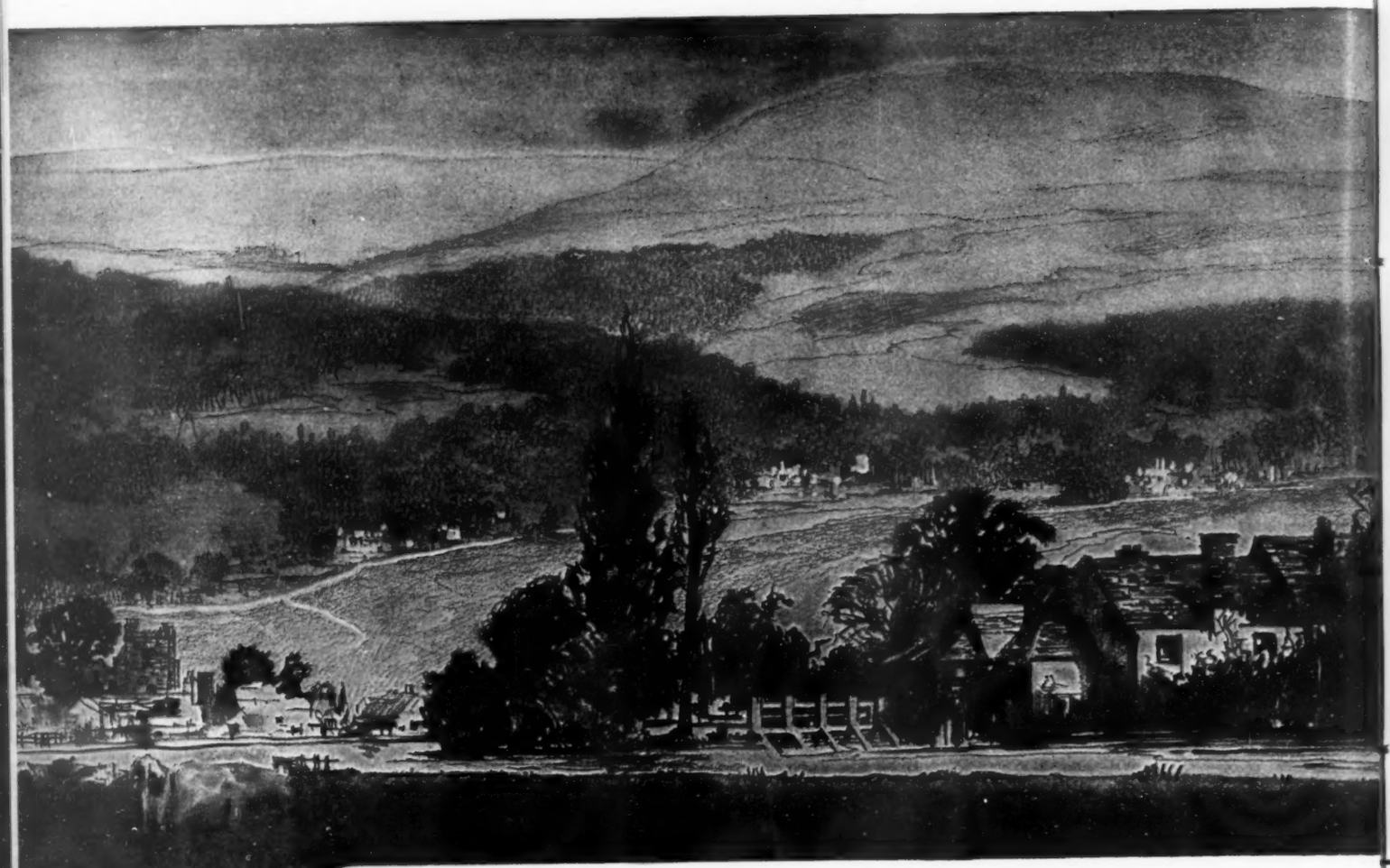
"The folder? Oh, we found it . . . right in the boss's briefcase . . . so now he's all set for the Convention, and I'll bet he comes back with a Loomis contract . . . for MY boss knows a good thing when he sees it!"

"We'll Be At Room 561 At The Stevens"

Loomis ADVERTISING COMPANY

Ft. Wayne 2, Ind., 502 Gettle Bldg.
St. Louis 1, Mo., 506 Olive St. Kansas City 6, Mo., 20 West 9th St. Bldg.
Upper Darby (Phila.), Pa., 6908 Market St. Omaha 2, Neb., Omaha Nat'l Bank Bldg.

LINK THE WORLD'S R



in the rural areas

WITH

STROWGER

TELECOMMUNICATIONS

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

Export Department,

NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2, ENGLAND

A705/3-A2(L)

RESOURCES . . .

The two essentials upon which civilisation depends, firstly to exist and secondly to progress, are man's ability to toil and Nature's provision of material. This association is seen in its closest form in the rural areas . . . the plough lands, the corn belts and the plantations, for there are the soil and the fruits of the soil.

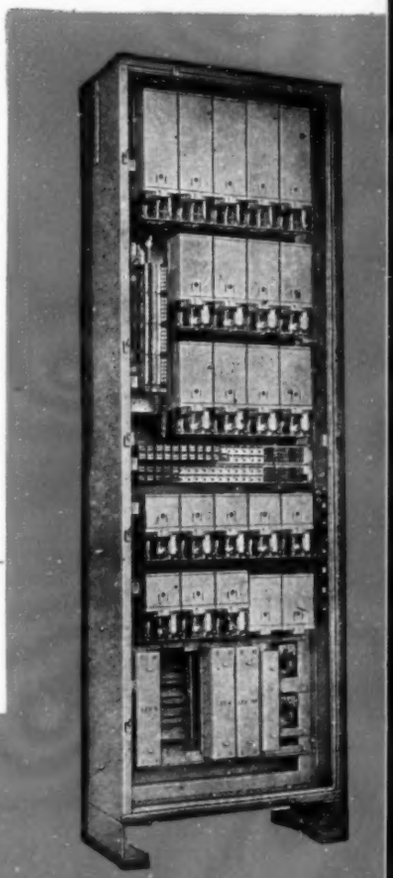
It is their cultivation which meets the first need of mankind in food, and subsequent requirements in the form of natural materials such as timber, rubber, cotton and the like.

The inhabitants of such areas are comparatively few, widely-distributed and occasionally isolated. Telephone service is very desirable and must cover internal connection between members of a perhaps tiny local community with facility for through calling both to nearby townships and distant cities. It should also be available by day and at night.

Strowger Unit Automatic Exchanges have been designed for just such circumstances; in result they enable operating authorities to provide service of a standard as high as that in any city at rates which are remunerative to themselves yet within the limited means of subscribers.

UNIT AUTOMATIC EXCHANGE

- *has been designed to serve small communities such as occur in rural areas.*
- *has the facility of functioning automatically and unattended.*
- *has a "24-hour"— that is day and night range of service.*
- *has unit construction; additional units can be added as the area develops.*
- *has means for the existence of faults to be checked by an operator at the parent exchange whilst serious fault alarms can be extended immediately.*
- *has automatic metering for local calls.*
- *has switch-hook supervision for the manua. operator at the parent exchange.*
- *has facility for calls to be made to subscribers on the parent exchange whether that be manual or automatic.*
- *has a dial speed range of 8 to 12 impulses per second and a voltage range of 46 to 52 volts.*
- *has application to coin-box working.*
- *has special signal for the parent exchange operator when a call is made from a call office.*
- *has power supplied by accumulators with either a rectifier or dynamotor for charging.*



STROWGER WORKS
LIVERPOOL, 7, ENGLAND

A705/3-A20

Roundtable LINE and DESK Discussions

Edited By
J. S. REED, JR.

Q. We are wondering which would be a more satisfactory method of stringing line wires in a rural open-wire lead, pulling them in over the crossarms, or laying them out on the ground and then raising them to the pole? What do you recommend?

A. An important factor in the building of a rural open-wire lead is the saving in time and labor by employing the proper method of raising wires to the poles. Experience has indicated that paying out the wires along the roadside from reels on a trailer hitched to the truck and then raising them to the crossarms or brackets, by means of a wire raising tool or handline, is the most satisfactory one to use in relatively open country. This method is less likely to brade or kink the wires than dragging them along the ground or over the crossarms. Where there is, however, likely to be considerable interference from trees or other obstacles in roadside stringing, the wires may be strung along the ground on the field side of the pole lead and then raised to the crossarms or brackets. The trailer may be hauled along the field side to pay out the wires on the ground, or, if it is more convenient to do so, it may be blocked in position as shown in the upper diagram in Figure No. 1 and the wires pulled off the reels by means of the truck as indicated in the lower diagram. When the reels are to be used in the stationary position, they may be placed one pulling section ahead of the last section strung and the wires pulled in towards that section. Additional coils of wire may then be placed on the reels and the wires pulled in through the next section in the opposite direction, as illustrated. This enables setting up the reels only once for every two pulling sections. It is recommended that the length of each pulling section be not greater than one-half mile.

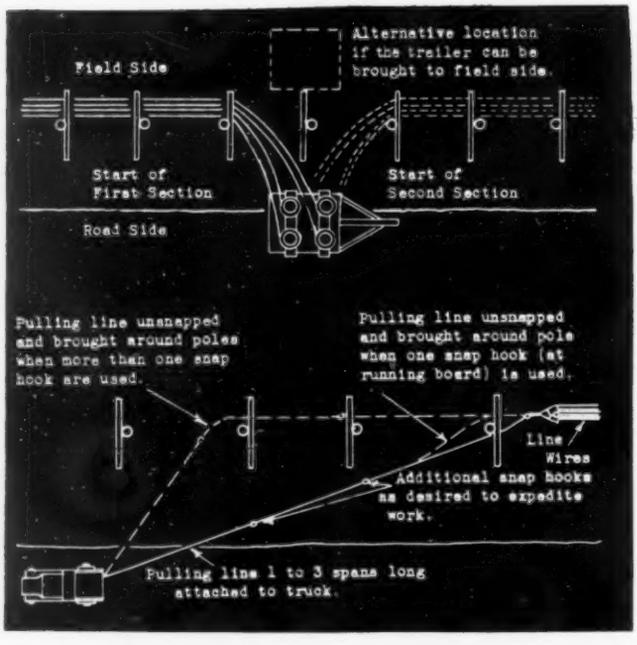

Alternative location if the trailer can be brought to field side.
Field Side
Start of First Section
Start of Second Section
Road Side
Pulling line unsnapped and brought around poles when more than one snap hook are used.
Pulling line unsnapped and brought around pole when one snap hook (at running board) is used.
Line Wires
Additional snap hooks as desired to expedite work.
Pulling line 1 to 3 spans long attached to truck.

Fig. 1—Method of stringing line wires along field side of pole lead. Upper diagram shows suggested locations of trailer. Lower diagram indicates use of truck and pulling line to haul line wires along field side of lead.

Q. Is it possible to use compression sleeves in the drop wire or bridle wire connection to an open-wire line and still be able to open the line whenever necessary for a test?

A. Compression sleeves can be used in the drop wire connection to an open-wire line. When the connection is made for the first time, a tap compression sleeve is employed to connect the drop or bridle wire to the line wires. Then when it is necessary to open the line for a test, one or both drop wire conductors are cut a few inches back of the tap splice. After the test is completed, small compression sleeves of the proper size are utilized to resplice the drop conductors together. This procedure may be repeated as many times as tests are made. If too many splices result, the old splices may be cut out and a piece of bridle wire cut in.

◆

Q. Are we justified in placing poles on property lines along a highway, when placing an open wire lead?

A. To avoid possible moving expenses, in event of highway changes, it is sound practice to locate your poles just outside the property line. Where tree growths along the roadway would interfere with the wires, it is generally desirable to obtain an easement from the property owner to run the pole lead on private land away from the trees.

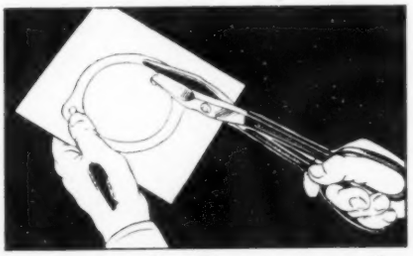
Free Help on Problems

IF YOU DON'T see a ready answer to your questions, let TELEPHONE ENGINEER'S staff of technical men tackle it for you. This is a free service. Your question and the resulting answer may not only solve your problem but help the many other telephone men reading these columns. Jot your questions on a postcard and look to LINE and DESK for reply.

Correct Tool Usage

(Continued from page 48)

Use Standard Type snips for straight cuts.



Use Circular Type snips for circular cuts.

Fig. 12—Use of cutting snips.

upper blade directly on the scribed line. Begin to cut with the metal well back in the throat of the snips. Stop the cut before the end of the cutting stroke is reached and then repeat the operation by taking another full bite. If the snip is permitted to cut completely through on each stroke a burred or ragged edge may

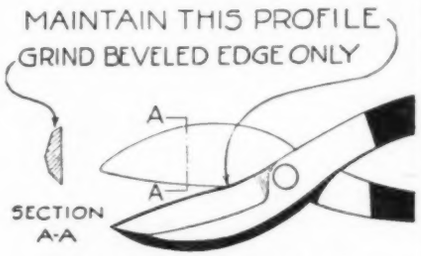


Fig. 13—Keep tin snips sharp.

result. It is also more difficult to follow a scribed line when used thus.

To cut an inside curve first drill or punch a hole of sufficient size to permit entry of the blade tip and gradually spiral out to the scribed line as shown in Fig. 12. When regrinding dull snip blades, care must be taken to maintain the original blade contour. Grind only on the beveled edge of the blade and in an amount necessary to restore a clean sharp cutting edge as shown in Fig. 13.—THE END

CROSSARMS MAY LOOK ALIKE, BUT—

Last Longer!

Any two crossarms may look alike in the stockpiles, but one may last 12 years on the line and another 36. The difference is the result of expert selection of raw material, scientific kiln drying and controlled air seasoning. Rainier Crossarms are properly conditioned for long-lasting life from the best grade of tough-grained Douglas fir. When you order crossarms, specify Rainier Crossarms made by

RAINIER

AMERICAN CROSSARM AND CONDUIT CO.

RECOMMENDED AND DISTRIBUTED BY

AUTOMATIC ELECTRIC
SALES CORPORATION

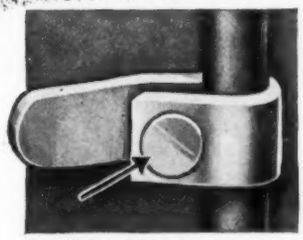
1033 WEST VAN BUREN STREET · CHICAGO 7, ILLINOIS

RADIO INTERFERENCE ELIMINATED
by Using
KEARNEY GROUND WIRE CLIPS

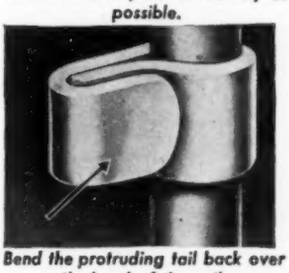
Overcome the possibility of an air gap forming between the clamp and the ground wire. Loose ground wires often cause considerable trouble and radio interference.

Kearney Ground Wire Clips provide a firm, rigid installation and positive contact between the ground wire and clip.

For complete information and prices, see your regular jobber or write—



Installation is simple — Slip the clip on ground wire and drive nail into pole as securely as possible.

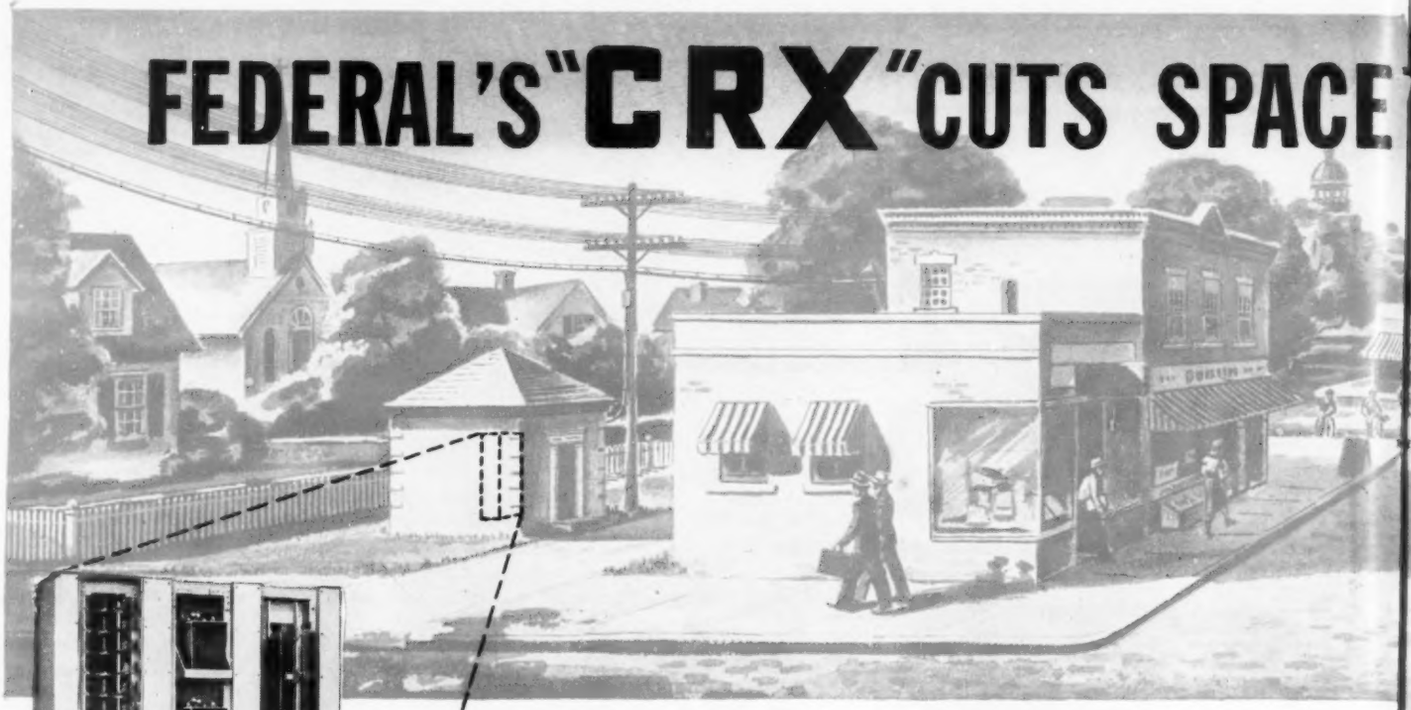


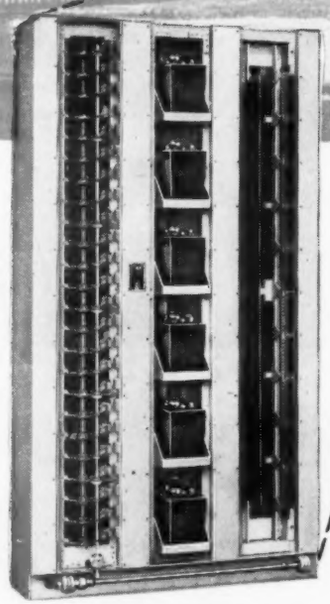
Bend the protruding tail back over the head of the nail.

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVE. • ST. LOUIS 10, MO.
Overhead and Underground Utility Equipment

FEDERAL'S "CRX" CUTS SPACE





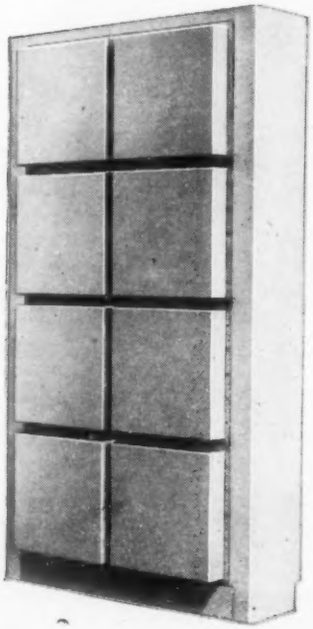
Switch side of 100-line CRX

For The SMALL COMMUNITY EXCHANGE This Means:

MORE LINE CAPACITY in available building space!

SMALLER BUILDING SPACE for a given line capacity!

PLUS **the advantages of simple, rotary equipment, completely self-contained, with factory-wired, interchangeable units.**



Relay-gate side of 100-line CRX

A COMPLETE 100-line exchange that occupies only 24" by 56" of floor space! Those are the actual dimensions of Federal's CRX. Compared to existing equipment, CRX saves at least 25% of installation space, and is correspondingly lighter in weight and easier to handle. It also establishes new standards of simplicity and economy of installation, operation, maintenance and extension.

Each equipment, with a capacity of up to 100 lines, is contained in a single master frame —shipped completely assembled and wired for the number of lines specified. Installation is simply a matter of moving it into place and connecting to power supply and distribution cables. For more than 100 lines, two or more master frames can be mounted together as shown in the diagrams at the right—with greatly simplified interconnection requirements.

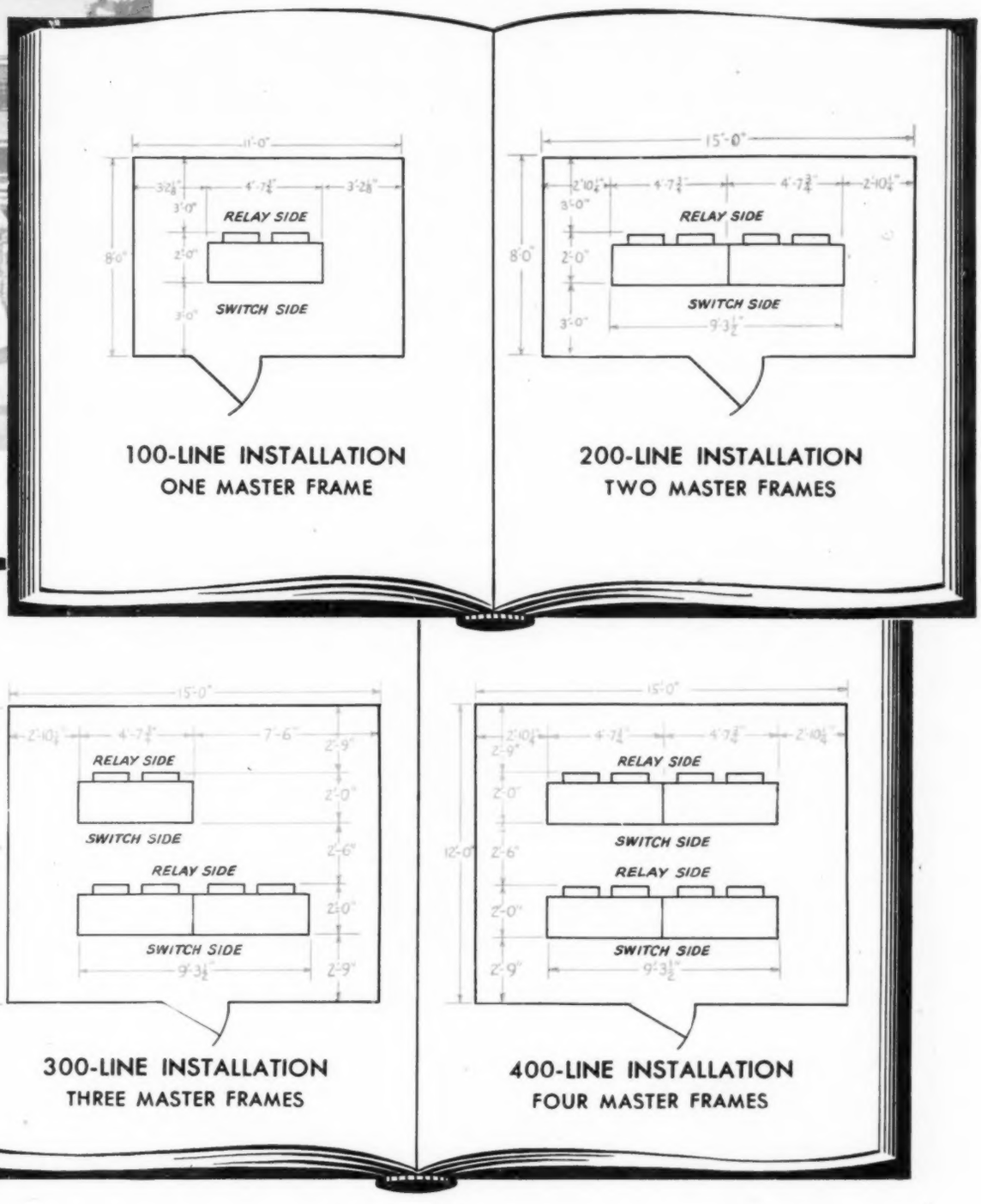
CRX is made up of *standard units*—which means that a complete exchange can be assembled to your specifications. Easy extension to meet future growth is obtained by adding interchangeable factory-wired units or additional master frames. Such extensions can, in most cases, be made by your own personnel.

For further information, write to Federal today—Dept. G 249.

Federal

KEEPING FEDERAL YEARS AHEAD... is IT&T's world-wide research and engineering organization, of which the Federal Telecommunication Laboratories, Nutley, N. J., is a unit.

E REQUIREMENTS AT LEAST 25%



100-LINE INSTALLATION
ONE MASTER FRAME

200-LINE INSTALLATION
TWO MASTER FRAMES

300-LINE INSTALLATION
THREE MASTER FRAMES

400-LINE INSTALLATION
FOUR MASTER FRAMES

Telephone and Radio Corporation

100 KINGSLAND ROAD, CLIFTON, NEW JERSEY

In Canada: — Federal Electric Manufacturing Company, Ltd., Montreal.
Export Distributors: — International Standard Electric Corp., 67 Broad St., N. Y. C.

50 Years Of Independent Telephony

(*Continued from page* 33)

C. Kingsbury, was made necessary by a chain of events.

The American Company had recently acquired control of the Western Union Telegraph Company. It was aggressively opposing the establishment and existence of Independent companies. It was, in short, displaying the characteristics of an organization determined to create and maintain a monopoly of communication services in this country.

The Independents, through their associations and otherwise, were yelling to high heaven about their treatment by the Bell. The Postmaster General of the United States had taken a look at the situation and had recommended that the telephone be government owned. Prominent members of the Congressional committees which would deal with the matter were said to be in favor of the idea. President Wilson had voiced his opposition to monopoly.

There was danger that at least long-distance telephone communications would be taken over by the government.

It was time for the Bell System to change its policies, and it did that. The result was the Kingsbury Commitment.

By this commitment the American Telephone and Telegraph Company assured the Attorney General that the Bell System would divest itself of its control of Western Union, would connect its toll lines, under certain conditions, with Independent exchanges, and would refrain from acquiring competing Independent properties if the United States Department of Justice or the Interstate Commerce Commission—which latter had been given Federal regulatory jurisdiction over telephone service—objected to such acquisition.

The Kingsbury Commitment did not settle all the differences between Independent and Bell Companies. But it did provide a new and more solid basis for dealings between them. For that reason it can be considered as having opened the second phase of the history of the relations between Independents and Bell.

Competing Exchanges Enter Merging Era

THIS SECOND phase was an era of mergers of competing telephone exchanges, of extension of the Bell System's toll network to nationwide proportions (the first transcontinental toll line was opened in 1915), and of rapid growth of the entire telephone industry. During this period the connection of Bell toll lines with non-competing Independent exchanges became a practical reality.

During it, also, most of the principal differences between Independents and Bell were disposed of with an important exception. This was the unrestricted acquisition by Bell operating companies of Independent properties or of substantial interests in or control of Independent companies.

Frequently the Independent companies so dealt with were the cream of the Independent non-competing crop in that territory. The result was a sapping of the strength of the Independent group to an extent much greater than the numerical loss of telephones by the Independent group would indicate.

Obviously this situation, if long continued, would in time reduce the Independent segment of the telephone industry to a group of only its smallest and weakest companies. If the Independent industry was to be preserved as a strong and virile institution, something had to be done. So the national Independent telephone association, then the present United States Independent Telephone Association, took up the fight, assisted by a number of the state telephone associations that had by then been organized.

The result was the issuance on June 14, 1922—almost nine years after the Kingsbury Commitment—of what became known as the "Hall Memorandum". This was a letter from Mr. E. K. Hall, Vice President of the American Company, to Mr. F. B. MacKinnon, President of the Association.

The Hall Memorandum stated it to be the policy of the Bell System "not to purchase or consolidate with connecting or duplicating companies except in special cases", and it provided that the Association would thereafter "be given notice of any such proposed transaction at least thirty days before the parties conclude any formal agreement."

If, then, the Association had objections to the transaction, it could make them to the regulatory bodies by which the deal had to be approved, including the Interstate Commerce Commission, which at that time had the job of determining whether the acquisition or consolidation of competing properties was in the public interest.

Prior to the telephone, messenger boys were kept on the run.

E. K. Hall Addresses National Convention

AT THE October, 1922 national convention of the Association, Mr. Hall made an address on "Bell-Independent Relations". (Significant of the change of the times was the fact that this was the first time in the history of telephony that a high Bell official had appeared at a national Independent convention.) The keynote of Mr. Hall's address was expressed in his following statement:

"I say without any question or equivocation or hesitation that in our

Just a simple little plug... IS IT?

BACK in 1895 Western Electric engineers developed a telephone plug that made *wrong* electrical contacts in the jack a physical impossibility. Today the basic design of plugs remains essentially unchanged.

Yet even such a "little" thing as a plug cannot be neglected in the broad program of research to improve telephone equipment.

At Bell Telephone Laboratories, engineers design special-purpose plugs as new needs arise—178 different designs, all springing from the basic development of 1895, are in use today.

At Western Electric, other engineers are constantly working to devise new manufacturing methods and machines to make plugs faster, more economically, in greater quantities. Last year 2,983,316 plugs were made.

Such never-ending care with countless "little" things helps to make America's telephone service the world's finest.

Western Electric

TELEPHONE APPARATUS AND CABLE

(Bell) judgment, it is to the interest of the two groups, it is in the interest of the industry and is in the interest of the public that there should continue to be two strong powerful groups in the industry."

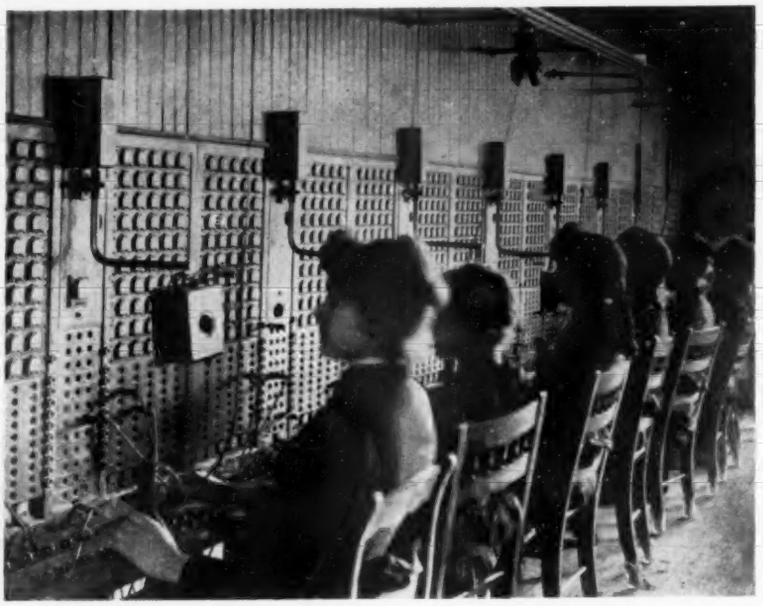
The importance of the Hall Memorandum and Mr. Hall's speech was not so much in the exact words used in either, but in the fact that the Bell System had definitely and publicly committed itself to a policy of non-acquisition of Independent properties except in cases of a special nature—of which there were some, as the Independents themselves recognized—and to a policy of maintenance of two strong groups in the industry.

During the 25 years that have passed since that time there has been a general cleaning up of the remaining competing exchange situations, with Independents, in some cases, acquiring the opposition Bell exchange. Various special situations have been worked out in one way or another. In a few cases the Independents have objected to proposed Bell acquisitions, generally resulting in the transaction not being completed.

In recent years most acquisitions by Bell companies have been of minor character, being usually distress situations of very small Independent companies unable to meet the demands on them for service, and cases where no other Independent company was in position, for geographical or other reasons, to take over.

The Hall Memorandum can be said to have initiated the third and present period in the relations between Independent and Bell companies. The smoke and heat of the old-time battles have long since blown away. Differences between the two groups are now settled around the council table, in peace and amity.

Present relations between the two groups, however, cover much more territory than the adjustment of the relatively few differences between them—differences which are usually no more than questions of the type that naturally arise, in the ordinary course of business, between diversities of ownership. During the years that have elapsed since the presentation of the Hall Memorandum there has come about a species of cooperation between the two groups in the telephone industry that has been helpful to both groups, and which is based upon due recognition by each group of the integral position of the other in the telephone industry in this country.



This early Burlington, Iowa, switchboard was far different from the boards of today. Note the box transmitters, the "drops," the ordinary household chairs.

The existence of two separate groups in the industry is recognized, as well, by governmental agencies, regulatory bodies and the like. Both Independent and Bell members are accorded places on important government and other committees dealing with matters affecting the telephone industry as a whole—such as the Industry Advisory Committee of the late War Production Board. And, within the industry itself, committees are formed of both Independent and Bell representatives for dealing with industry-wide matters of various kinds.

Such propositions as, for illustration, the integration into telephony of suitable wartime developments in communications, are recognized by both groups as matters of industry-wide importance requiring industry wide cooperation. Another case in point is the desire of the telephone industry as a whole to bring about nation-wide extension of farm telephone service. In this latter case Bell developments with respect to the use of power lines for rural telephone service have been made available, license-free, to Independent companies.

It can therefore, we think, be correctly said that there now exists in the telephone industry in this country, regardless of its diversity of ownerships, an element of solidarity which has as its principle aim supplying the country with the best possible telephone service.

Independent Telephone Manufacturers

THERE IS an element in the history and development of the telephone which, even standing alone, amply justifies the existence through the years and now of Independent telephony. This is the value, in the development of the art, of the many important contributions made to telephony by Independent telephone manufacturers.

Since Independent telephone companies could not, in the early days, obtain Bell telephone equipment, there could of course been no beginning of the Independent telephone industry if there had not been somebody to manufacture telephone equipment for the Independent companies. And there was somebody to do the manufacturing, even before the expiration of the two first Bell patents in 1893 and 1894—a number of manufacturers who made and sold telephone equipment and telephones of their own design, to the accompaniment of a constant barrage of infringement suits and other patent litigation.

Great impetus was given to Independent manufacturing by the expiration of the two Bell patents; also by the nullification by the courts, in 1895, of a transmitter patent granted Emil Berliner, acquired by the Bell and which, if valid, would have extended the Bell patent monopoly for a number of years.

According to available records there were, at one time or another during the period from 1890 to about 1910, some 75 manufacturers of telephone equipment in the Chicago area alone.

With so many manufacturers throughout the country competing for the business of the growing Independent operating companies, it was natural that new ideas and new developments of the telephone art came fast and furiously, just as technical progress occurs rapidly in any industry under competitive stimulus. The record of "firsts" in the development of the art by Independent manufacturers is long and impressive.

The list includes such valuable contributions as the self-restoring switchboard drop, self-soldering heat coils, compact-type wall sets, divided circuit ringing, bridged bells, improved hookswitch assemblies, harmonic selective party tuned bells, ringing converters, the "feature" manual switchboard, improved transmitters and receivers, and many other items of great value to telephony.

Most important of all was the invention and development of the automatic telephone—the greatest basic change in the art of telephony since the birth of the telephone. It was, for many years entirely an Independent development.

The first commercial automatic exchange was installed in 1892, for an Independent operating company. It was not until 1919—27 years later—that the Bell System officially adopted the automatic telephone; the first Bell System automatic exchanges were manufactured by an Independent manufacturer.

Before that time, 1919, automatic telephone systems were in operation at many and important Independent exchanges in the United States, and also in cities in Canada, England, New Zealand, Hawaii, Cuba and other countries.

Without the Independent manufacturers there could not have been, and would not be, any Independent telephone companies. Also, without the Independent manufacturers and operating companies, the telephone industry and art would likely now be many years behind its present size and development.

The facts show clearly that no one organization, however large, can think of and do everything. That is likely to be as true in the future as it has been in the past.

We have mentioned the importance, in the changing relations through the years between Inde-

FOR YOUR CONSIDERATION

STEEL CROSSARM BRACES
(HOT GALVANIZED)

† No. 8020 Plain Style

No. 6620 Ribbed Style

All Hubbard Flat Steel Crossarm Braces are now made with rounded corners. The elimination of sharp cornered braces will be welcome news to Linemen. Mounting holes are punched for a ½-inch lag screw at the pole end and a ⅝-inch bolt at the arm end. Ribbed Style Braces afford approximately 25% more strength in compression. Both ends of Ribbed Braces have been left flat for a sufficient length so that the rib does not interfere with the crossarm if mounted inside.

†A. T. & T. Co. STD.

ALSO—POLE LINE HARDWARE FOR ALL TELEPHONE CONSTRUCTION REQUIREMENTS

ANCHORS, PLATE AND SCREW • BRACES • BRACKETS, POLE, CORNER AND HOUSE • CABLE SUSPENSION HARDWARE • CARRIAGE BOLTS CROSS ARM BOLTS • CABLE RACKS • CABLE SHIELDS • DRIVE HOOKS EXTENSION ARMS • EYE BOLTS-HUBEYE • GRADE CLAMPS • GUY CLAMPS • GROUND RODS • GUYING ACCESSORIES • GUY PROTECTORS GUY HOOKS • HUBEYE NUTS • HUBEYE BOLTS • LAG SCREWS MESSENGER DEAD ENDS • MACHINE BOLTS • MANHOLE LADDERS POLE SEATS • POLE BALCONIES • PINS • POLE STRUTS • POLE STEPS STUBBING BANDS • STRAIN PLATES • STORM GUY ATTACHMENTS SIDE-WALK GUYS • SPAN CLAMPS • TRANSPOSITION BRACKETS

"HANG THE LOAD ON HUBBARD HARDWARE"

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH . . . CHICAGO . . . OAKLAND, CALIFORNIA

pendent and Bell companies, of the Independent telephone associations. Without them, beyond doubt, the course of telephony would have been profoundly changed and the Independent telephone industry would probably now be something much less important than it is.

Early Days of The National Association

THE NATIONAL Telephone Association, the first Independent organization intended to be of country-wide scope, was organized in 1897, fifty years ago. In January, 1902, another association was formed, specifically for the purpose of representing Independent telephony, both operating and manufacturing, in Illinois and adjoining states. This organization was named "Interstate Independent Telephone Association of America".

In 1904 the first association changed its name to "National Independent Telephone Association". This organization and the Interstate association were merged, in 1905, under the name "National Interstate Telephone Association". In 1906 Independent telephone companies in Canada were made eligible for membership, and the name was changed to "International Independent Telephone Association of America."

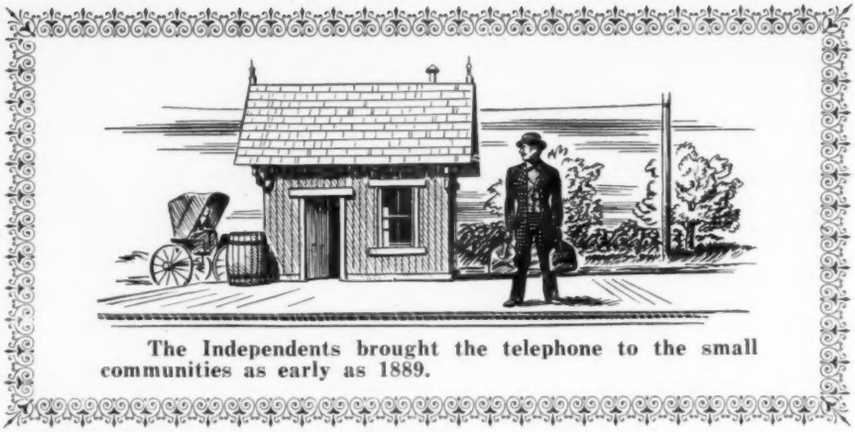
This name apparently turned out to be too much of a mouthful, and in 1909, it was changed back to an earlier name, "National Independent Telephone Association".

Differences arose within the association with respect to qualifications for membership—a backwash, of course of the fight with the Bell. So, in 1913, a group of members withdrew from the National association and formed "The Independent Telephone Association of America."

The differences were not of long duration. In December, 1915, the two associations held a joint convention in Chicago and were merged into the present United States Independent Telephone Association.

This organization has, for the past 32 years, nationally represented the entire Independent telephone industry, including as members both Independent telephone operating companies and manufacturers. It will celebrate, at its coming "Golden Jubilee" convention to be held in Chicago in October, 1947, the fiftieth anniversary of the organization of a national Independent telephone association.

It has of course been years since the principal objective of the association was to protect Independents from Bell. The association's activities are now similar to those of other effective trade organizations that are national in scope; educational, informational, and having to do with legislative, regulatory and other matters of national importance to the industry it serves. It continues, as for many years, to be the national clearing house for the exchange of ideas for the furtherance of the purposes and objectives of Independent telephony.



The Independents brought the telephone to the small communities as early as 1889.

In its work the association is ably assisted by the some 33 active state telephone associations.

The telephone was one of the basic inventions of all time. Upon it there has been built one of the great industries of the world. In the United States alone the investment in telephone plant at the end of 1946 was near 7 billion dollars, and gross revenues of the telephone industry in this country for 1946 were near 2 billion, 300 million dollars.

Recent and particularly postwar growth of telephones in service in the United States has been at a pace much faster than that of earlier days. At the time of the Kingsbury Commitment, in 1913, there were some 9 million 500 thousand telephones in this country. At the time of the Hall Memorandum, in 1922, there were about 14 million, 300 thousand. At the end of 1940 there were about 22 million. At the end of 1946 there were some 31 million, 600 thousand. The number is now well past 32 million, and several millions of applicants are still waiting to be served when the necessary additional equipment and plant can be provided.

The Bell Telephone System, operating in the great metropolitan areas of the country as well as in many other places, and with its vast nationwide toll plant, has of course the bulk of the investment and revenue. Yet the Independent segment of the Telephone industry is in the aggregate no small business.

According to statistics of the United States Independent Telephone Association, at the end of 1946 companies not owned or controlled by the Bell Telephone System had some 760 million dollars of telephone plant, and their gross revenue for 1946 was more than 200 million dollars.

These 6,000 companies owned and operated, at the end of 1946, about 12,000 exchanges, with some 5,950,000 telephones.

Although most of the Independent exchanges are small, operating in the small towns, villages and rural sections of the country, there are 201 "Class A" Independent companies with annual revenues of more than $100,000 each—a number of them with revenues of a million dollars or more annually. There are also some 60 "Class B" Independent companies, with annual revenues of between $50,000 and $100,000.

Since about 1924 there has been taking place an accumulation of Independent properties into groups of companies each under a single top ownership or control. A considerable number of such groups, of varying sizes, now exist. Approximately 2,000,000 Independent telephones are now under the ownership of the 15 largest of these groups.

The actual geographical area served by Independent companies—operating to a considerable extent in the great agricultural sections of the country—is considerably larger than the combined area served by the Bell System Associated Companies.

The Independent telephone industry is very much a going concern. It has its own manufacturing facilities, with highly effective laboratory and development organizations. It has its own associations, national and state. It has its own very able trade press. It has its own organization of pioneers of the earlier days of Independent telephony.

The bonds of Independent telephone companies of sufficient size to

do public financing—securities which were once in the category of the proverbial "drug on the market"—now find ready acceptance, at satisfactorily low interest rates, by institutional as well as other investors. Preferred and common stocks of such companies are now considered prime investments by thousands of stockholders.

Independent telephone managements, alert to changes in the art arising from the rapid wartime and postwar developments in such fields as electronics and radio, are rapidly integrating into Independent operations such new devices and classes of service as carrier current, mobile radio telephones, telephone service over power lines and so on.

The great energy of the telephone industry is no longer expended in inter-industry fighting. It is now used by both groups in the industry to extend and improve telephone service in the United States and to continue to maintain it as what it has always been—the best in the world.

The United States Independent Telephone Association can fittingly celebrate the 50th anniversary of the organization of a national Independent telephone association in the knowledge, comforting to both groups in the telephone industry, that there is not and has never been a telephone monopoly in this country. Also, that there never will be one so long as the Independents continue to exist. And that, according to indications, will be a long, long time.—THE END.

Washington Bureau Reports

(*Continued from page 28*)

ardent and outspoken critic of the Taft-Hartley Act, vigorously prosecuting a course designed to break down the dispute at any cost.

The New York municipal head, incensed over the two-year battle which has held up completion of the new Idlewild Airport and frankly fearful that continued delay will bring another flood of fatal aircraft accidents at overcrowded LaGuardia Field, has been reportedly ready to use city civil service workers to complete the installations. Furthermore, he has informed the New York Telephone Co. that the work must be finished even at the risk of a strike, and the company has acceded to this position.

Yours for the Asking

This

Engineering Manual for Long-Span Lines

Pertinent and timely information on how to build long-span, low-cost rural lines of *Crapo* High-Tensile Telephone Line Wire is contained in this illustrated Engineering Manual. The book is designed especially to assist operating companies in furthering their plans for extending and improving rural service.

The contents include electrical and physical characteristics of both *Crapo* HTL-135 and *Crapo* HTL-85 Line Wires; tables of stringing sags and tensions; recommended construction practices; information on guying, metalicizing and transposition, river crossings, etc.

If you have not received a copy of this Manual, be sure to ask for one! Direct your inquiry to your distributor of *Crapo* Galvanized Telephone Wire and Strand, or write us for Manual No. 203.

Crapo HTL-135 Telephone Line Wire possesses two and one-half times the strength of standard B. B. wire; makes practicable spans of 350 feet in heavy loading to 500 feet in light loading districts. *Crapo* HTL-85 permits spans of 225 feet in heavy loading, 375 feet in light loading districts.

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

Crapo HIGH-TENSILE TELEPHONE LINE WIRE

The Fall Constuction Program

(Continued from page 36)

be computed from pole line design equations available in telephone handbooks. However, many Independent companies use available "standard tables" which give the class pole for various service classifications and loading. These tables (see table No. 2) are representative of the design practice of most companies.

Cable Plant Repairs and Construction

A MORE CAREFUL inspection is required to detect defects in cable plant than in open wire plant. Cable is particularly vulnerable to tree wear which may result in serious sheath damage yet which could easily be passed up by a careless inspector. The cable plant inspector should be on the alert for missing rings, bad ring wear, excessive bowing, inadequate tree clearance, excessive pull at corners or terminal legs, and any other condition likely to cause a sheath break or excessive sheath wear.

Because of the difficulty in getting cable, some companies are now finding it necessary to make temporary repairs to defective sheath of cable which would normally be replaced. Cracks and crystallized sections of cable can be closed to prevent the entrance of moisture by the use of ordinary friction tape. Two layers of tape should be placed tightly over the sheath in a reverse direction over the defective area. If the repair is to remain in service more than one year, it is advisable to weather proof the tape by painting it with a good grade of asphalt paint. The inspection of cable plant should take into account the need for additional terminals to eliminate long drop wire feeds paralleling the cable. Cables that have begun to show wear at the rings in many cases can be given extended life by removing the rings and spinning the cable to the strand. The spinning of old cable must be carefully done and the sheath inspected afterwards as handling of the cable may result in some cracks showing up at badly worn places. These can usually be repaired by the "arc welding method".

Drop wire has always been one of the most perishable items in outside plant and a large percentage of all trouble calls are due to defective drops. The periodic inspection and repair of drop wire plant and adequate tree clearance is always recommended. The time required to provide tree clearance for drops is much less than the time required to correct trouble in drops which have worn through because of tree abrasion. In one case the operation is on a "retail" basis and the other on a "wholesale" basis, not to mention the fact that in many instances the drop is so badly worn that replacement is often necessary, thus involving a material as well as a labor cost.

The new plastic type drop wire now available will withstand substantially more tree abrasion than old style drop wire, but even though its resistance to abrasive damage is greater, it should be given adequate tree clearance for long life and freedom from service interruption.

Tree Trimming Along Rural Leads

TREE TRIMMING seems to be more of a headache now than ever, particularly in the rural districts. With labor costs now more than double pre-war levels, the cost of keeping tree limbs out of rural and toll leads can be a severe drain on the maintenance expense account. Some companies have found that they can contract their tree trimming program to private firms or individuals at a saving.

One of the larger Independent companies has made an extensive study of how annual tree clearance costs can be reduced. The study has shown a few ways in which improved results can be obtained but no outstanding solution to the problem has yet been attained. The extensive use of alley type arms to provide clearance from property line

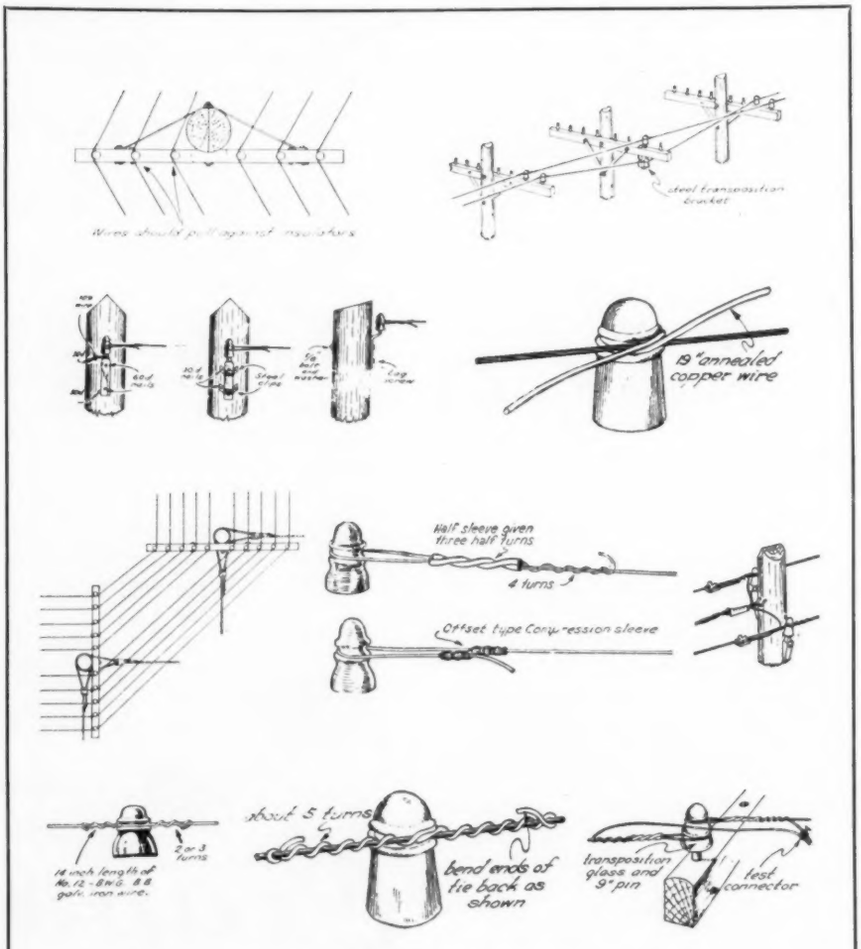

steel transposition bracket
19 "annealed copper wire
Half sleeve given three half turns
4 turns
Offset type Compression sleeve
about 5 turns
bend ends of tie back as shown
transposition glass and 9" pin
test connector

Fig. 5—Features of open wire construction.

trees has been effective in some areas. The clearing of heavy brush and young trees from under the lead has been accomplished by means of bull dozers at costs considerably under manual clearance methods. Consideration is also being given to the use of weed killers (2-4-D type) on certain types of small tree and brush growth in an effort to hold down or eliminate bad tree and brush situations.

It occurs to the writer that a large percentage of the cost of tree removal results from the use of hand trimming tools rather than motor or engine driven tools. The availability of new high speed tools, as for example, the high frequency (180 cycle) one-man chain saw, seems to offer a means of reducing the labor requirements for this normally expensive operation.

Crosstalk Problems

THE EXPANSION of rural power lines has raised the noise level substantially on many rural lines. Grounded lines are of course, definitely doomed by the rural power line and every company that is now operating grounded lines should promptly set up a long range program designed to put everything on a metallic basis as quickly as finances will permit. But merely making the rural lines metallic is not the complete answer. The lines must be kept electrically balanced from a series and shunt impedance standpoint and must be accurately transposed if noise levels are to be kept down.

Some companies are adopting the new Hemingway No. 56 "point type" transposition insulator for use on all rural lines. This insulator, though higher in cost than the No. 9 or No. 12 insulators, results in a simplified type point transposition with better balance than the old rolling type transpositions. The No. 56 insulator requires no tie wires at the transposition point and is much easier for the small company to apply than the drop bracket (or two-piece glass) types of transpositions. This new insulator is particularly useful in the retransposition of old lines. There are various methods of transposing rural and minor toll lines. The Bell System N Section scheme is very effective for rural or short minor toll lines.

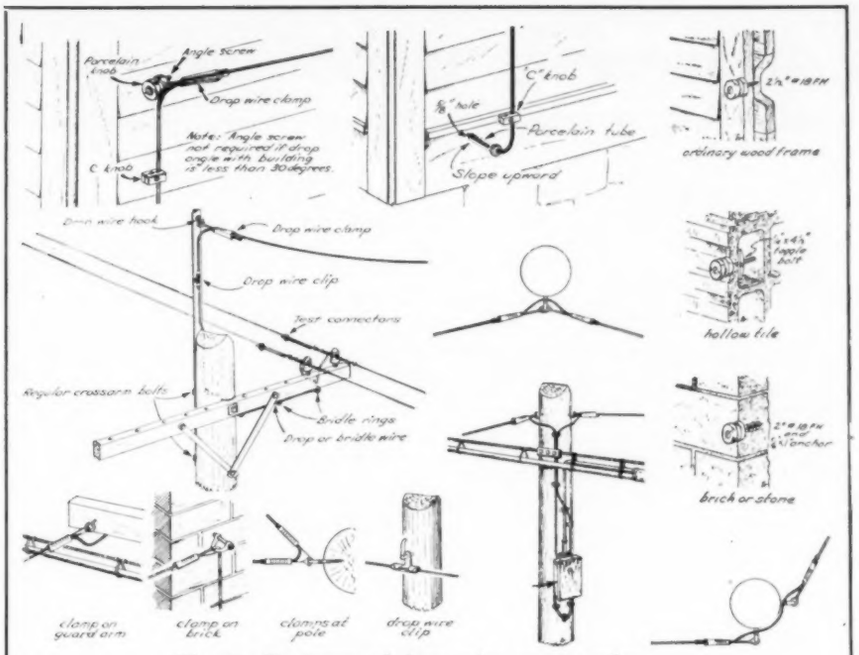


Fig. 5—Features of drop wire construction.

The Proper Sag

THE IMPORTANCE of providing the proper amount of sag in open wire strung under various temperature conditions is often overlooked. The tendency, where sag gauges are not used, is to pull wire too tight in order to make it "look nice". The effect on tension of stringing a 104 mil copper wire to a sag of only one inch instead of ten inches. When the wire is loaded with ice and wind the tension tending to break the wire would be much greater. Table No. 3 gives sag data.

Underground Conduit Entrance For Small Offices

IN MAKING repairs or doing reconstruction work on cables leading into or near the central office, consideration should be given to the use of underground duct. An underground entrance presents a much better appearance than an aerial entrance and the cables which carry all of the exchange circuits deserve the better protection afforded by underground construction. Small companies will find either the asbestos-cement or asphalt-impregnated fiber tubular duct useful for short runs of one or two cables. This type of conduit, which comes in ten foot lengths, can be installed much easier than multiple-tile duct. Special water tight tapered sleeves are available for coupling adjacent sections together. The new jeep type digger machines that are available in many areas on a contract basis, enable narrow trenches to be dug for conduit at relatively low cost.—THE END.

Table No. 3—Recommended Sag for 104 Copper, 109-BB Iron, or Amertel—85-109 Steel

Span Length (feet)	Stringing Temperature (F)										
	100°	90°	80°	70°	60°	50°	40°	30°	20°	10°	0°
	Sag in Inches										
80	6	6½	6	4½	4	3½	3	2½	2½	2½	2
90	7½	7	6	5½	5	4½	4	3½	3	3	2½
100	9½	8½	7½	6½	6	5½	5	4½	4	3½	3½
110	11½	10	9	8	7	6½	6	5	5	4½	4
120	13½	12	10½	9½	8½	7½	7	6	5½	5	4½
130	16	14	12½	11½	10	9	8	7	6½	6	5½
140	18½	16½	14½	13	11½	10½	9½	8½	7½	7	6½
150	21½	19	17	15	13½	12	11	9½	9	8	7½
160	24	21½	19	17	15	13½	12½	11	10	9	8½
170	27½	24	21½	19½	17	15	14	12½	11½	10½	9½
180	30½	27	24	22	19	17	15½	14	12½	11½	10½
190	34	30	27	24½	21½	19	17½	15½	14	13	12
200	38	33½	30	27	23½	21	19	17	15½	14½	13
210	41½	37	33	30	26	23½	21	19	17½	16	14½
220	46	40½	36	32½	28½	25½	23	20½	19	17½	16

Emergency Power Plants

(Continued from page 44)

Standard makes of emergency generating plants are so designed that the drop in voltage between no load and full load is seldom over ten to fifteen volts. This is sufficiently good as to eliminate the need for special voltage regulating equipment. The frequency variation seldom falls outside the range 62-58 cycles per second. The voltage and frequency regulation characteristics of a typical 2000 watt plant are shown in Figs. 3 and 4.

Fuel Consumption

EMERGENCY power plants in the higher capacities are available with either diesel or gasoline engines as drivers. The gasoline engine is lower in first cost and in view of the limited time an emergency set is likely to be in operation in the telephone office application, the fuel cost is not an important factor. However, the gasoline engine generates more of a problem than the diesel engine from the standpoint of fuel shortage. But here again, the time the unit is in operation is so short that some satisfactory arrangement can usually be provided which will meet with the Underwriters Rules with respect to the handling and storing of gasoline.

The gasoline consumption in gallons-per-hour, for a 2000 watt plant is shown in Fig. 5. The gasoline consumption (for full load) for each 1000 watts generated in small and medium size plants will vary from 0.20 to 0.35 gallons-per-hours.

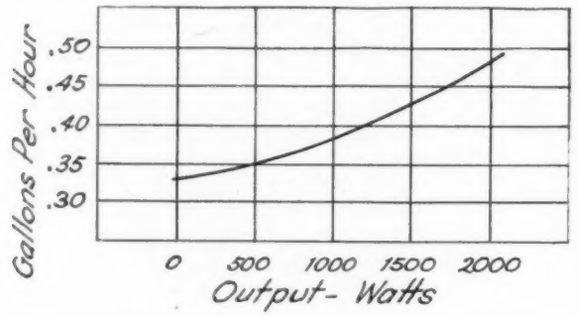


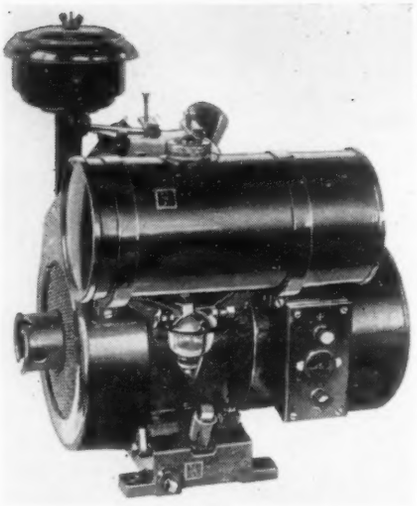
Fig 5—Gasoline consumption of air-cooled, engine driven emergency power plants.

Miscellaneous Use of Portable Power Plants

Some of the smaller telephone companies that have not felt justified in making the necessary investment for a standby emergency power plant have found that they can prove in a plant of the dual purpose type. These are merely plants so arranged as to be readily portable, hence, usable for outside plant construction but in cases of emergency they can be used as a source of primary power for the central office equipment and building appliances.

A 2500 or 3000 watt plant is recommended as the smaller plants are hardly adequate in power capacity to operate motor driven saws, drills, hole digging equipment, etc. Some of the miscellaneous applications of the portable power plant are:

(1) Pole hole digging (used in connection with a Kamo type digger).
(2) Operation of floodlights or emergency night repairs,
(3) Operation of electrical drills and saws in connection with hole framing or stepping operations,
(4) Operation of motor driven manhole pumps or blowers,
(5) Operation of small electric winches on trucks,
(6) Operation of motor driven wire winding reels,
(7) Operation of electric heaters in cable splicing operations in manholes or tents during the winter months.



Typical single cylinder air cooled motor.

Conclusions

IF THE prospective purchaser is not sufficiently familiar with engine generator practice to decide from the above exactly what he wants, it is suggested that he give a general description of his requirements and preferences. Then he can be furnished with copies of specifications and sales literature that apply

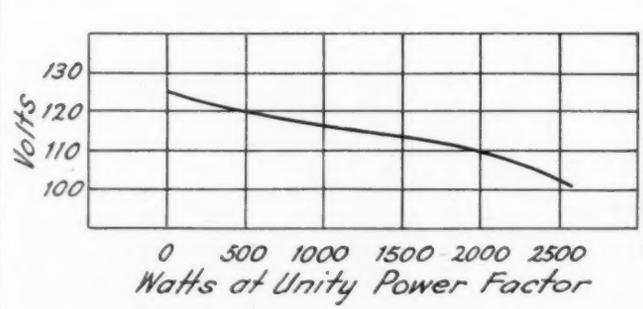


Fig. 3—Voltage regulation charactersitics of typical emergency power plants.

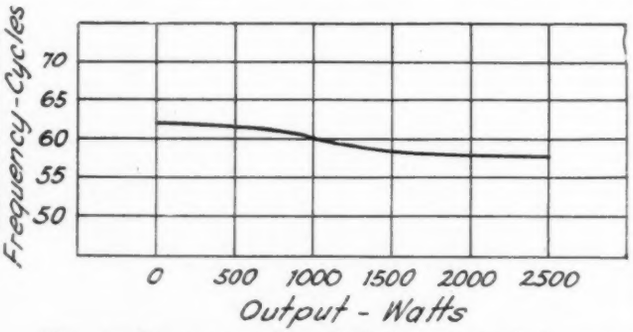


Fig. 4—Frequency characteristics of typical emergency power plants.

and make final decisions from the information obtained from these.

Too much stress cannot be placed on the importance of avoiding the use of general terms in describing requirements such as specifying 110 volts when the voltage is actually 115 or 220 or some other value.

It should be remembered that the use of higher voltage machines is economical from all angles, i.e., purchase price, floor space, size of leads, size of conduits, cost of operation of connected load and flexability in applying facilities.—THE END.

Mutual Liquid & Gas Equipment Co. Issues Catalog

Favorably known to many Independent telephone companies, the Mutual Liquid Gas & Equipment Co., Inc., Inglewood, California, plans to make its equipment available on a larger scale. The company has recently issued its catalog describing many items

Joseph F. Fagan, president and general manager of Mutual Liquid Gas & Equipment Co.

of equipment now available. Copies of this catalog may be obtained direct from the company.

Under the leadership of Joseph S. Fagan, president and general manager, the Mutual Liquid & Gas Equipment Co. has developed a successful leadership in its field.

Mr. Fagan's experiences date back to the early 1900, when he worked as a telephone lineman in the Rocky Mountain area. During his early day experiences, Mr. Fagan had used the old conventional types of furnaces and torches and had visions of faster, more efficient methods of melting lead and compounds. This desire to improve then existing methods lead to the organization of the Mutual Liquid & Gas Equipment Company.

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FOR QUALITY Superior workmanship, advanced design, and the finest materials are combined to give these famous Stephens Climbers a margin of quality unmatched for nearly half a century.
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Leich Electric Co. Announces Organization Changes

THE LEICH Electric Company, Chicago, has announced that A. C. Reid, president of the company since 1939, became chairman of the board of directors, effective September 1. Roy W. Siemund assumed the duties of president on that date. Advanced to vice-presidents are H. P. Boswau, who will be vice-president in charge of engineering, and P. A. Hagen, who will be vice-president in charge of manufacturing.

Mr. Reid has been with the Leich organization since its founding in 1907. In the beginning the company was known as the Cracraft-Leich Electric Company, and Mr. Reid was mainly responsible for the organization of the engineering and manufacturing operation.

In 1912 when the company name was changed to Leich Electric Company, Mr. Reid became chief engineer. Upon the death of Mr. Leich in 1935,

A. C. Reid, new Chairman of the Board, Leich Electric Company.

he became vice-president and general manager, which position he held until his election as president in 1939.

While his executive duties have always kept him busy, Mr. Reid nevertheless found time to do practical work and his engineering contributions to the Independent telephone field are worthy of note.

Among his inventions was a vibrating ringing converter to operate from 60-cycle alternating current, said to be the first ringing machine of its kind. He also pioneered in the development of harmonic and pulsating ringing and introduced one of the first pulsating harmonic systems for magneto telephone systems.

R. W. Siemund, new Leich Electric Company President.

Another of Mr. Reid's developments was a "trickle" charging method of charging storage batteries. One of the first battery signalling magneto telephones was the work of Mr. Reid in collaboration with Oscar Leich. The handset transmitter with submerged electrodes and cone-shaped diaphragm in use today was another of Mr. Reid's contributions to the art of telephony.

The new president, Mr. Siemund, is well-known to the telephone industry as president of Leich Sales Corporation and has been vice-president of Leich Electric Company since 1939. Just as with Mr. Reid, practically all of Mr. Siemund's working lifetime has been spent in the telephone industry and his thorough knowledge of the operating companies problems should prove valuable indeed in the management of the Leich.

Roy Siemund began his telephone career at an early age with the Kellogg Switchboard & Supply Company, gaining experience at that company's main office in Chicago and also at its branch in Atlanta, Georgia.

In 1925 he left the Kellogg company to organize the supply department of the Monarch Telephone Manufacturing Company. When that company was merged with American Electric Company Mr. Siemund continued as supply sales manager, and later was given charge of equipment sales. In 1931, when the sales organization of the American Electric Company and the Automatic Electric Company were united under the name American Automatic Electric Sales Company, he retained his position in charge of supply and manual equipment sales and in 1933 was named vice-president.

H. P. Boswau, Leich Vice-President in charge of Engineering.

In 1937 Mr. Siemund resigned from his position as vice-president and sales manager of the Automatic Electric Sales Company to join the Leich organization.

New Vice-President in charge of Manufacturing is P. A. Hagen.

Mr. Siemund is a director of the United States Independent Telephone Association as well as of the Independent Telephone Pioneer Association, and last year was president of the latter organization.

(Please turn to page 92)

THE NEW TURNER

Low Pressure FIRE POT

NEW IN PRINCIPLE, DESIGN, AND PERFORMANCE

WITH "CARBURETOR CONTROL"

Features the exclusive *adjustable* air syphoning tube which enables the pot to operate at a pressure of only 20 to 30 pounds as compared with 40 to 60 pounds for old style models. Tube can be moved back and forth in the burner . . . permits instant balancing of the gas and air mixture by actually syphoning air from the outside to meet widely varying fuel and job conditions. Important because it means more perfect combustion . . . a more intense flame, concentrated at the proper point and not distributed over the entire coil . . . eliminates carbonization . . . insures longer coil life!

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Construction assembly permits quick, easy accessibility and cleaning . . . windshield, top plate, and bail handle are one unit, and can be lifted from tank in five seconds by loosening one wing nut. This construction also provides the sturdy support necessary to carry a heavily loaded pot of lead, and is far superior to the old style upright posts.

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Tank is of unusually strong construction . . . has heavy protector ring on bottom, large funnel-filler cup, new style wide-seat filler plug and protective dust cap, large drip cup and an overflow cup, heavy blow-proof brass pump.

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"Penta" Preservative contains *Pentachlorphenol*, a product of *The Dow Chemical Company*.

Lightning Protection

(*Continued from page 40*)

try and as high as 90 in other parts. The expected rate of cable failures is taken proportional to the number of such days for the locality in question. The theoretical curves of "lightning trouble expectancy" for buried cables shown in Figure 7 are for convenience referred to ten thunderstorm days per year. They are based on normal core insulation, on a current wave-shape similar to that of Figure 2, and on the crest current distribution shown in Figure 5.

From Figure 7 it is evident that the rate of cable failures to be expected, and hence the need for remedial measures, depends greatly on the earth resistivity. Of particular importance in the majority of cases is the resistivity up to a depth of ten feet or so. With low resistivity to this or greater depths, the danger of a direct stroke to the cable is small, and if the resistivity is low to considerable depths—a few hundred feet—strokes other than direct strokes are not usually of importance. When, however, the resistivity at depths beyond ten feet or so is very high and the cables are of small size, strokes to ground may cause insulation failures, and this is also true of discharges between clouds.—THE END.

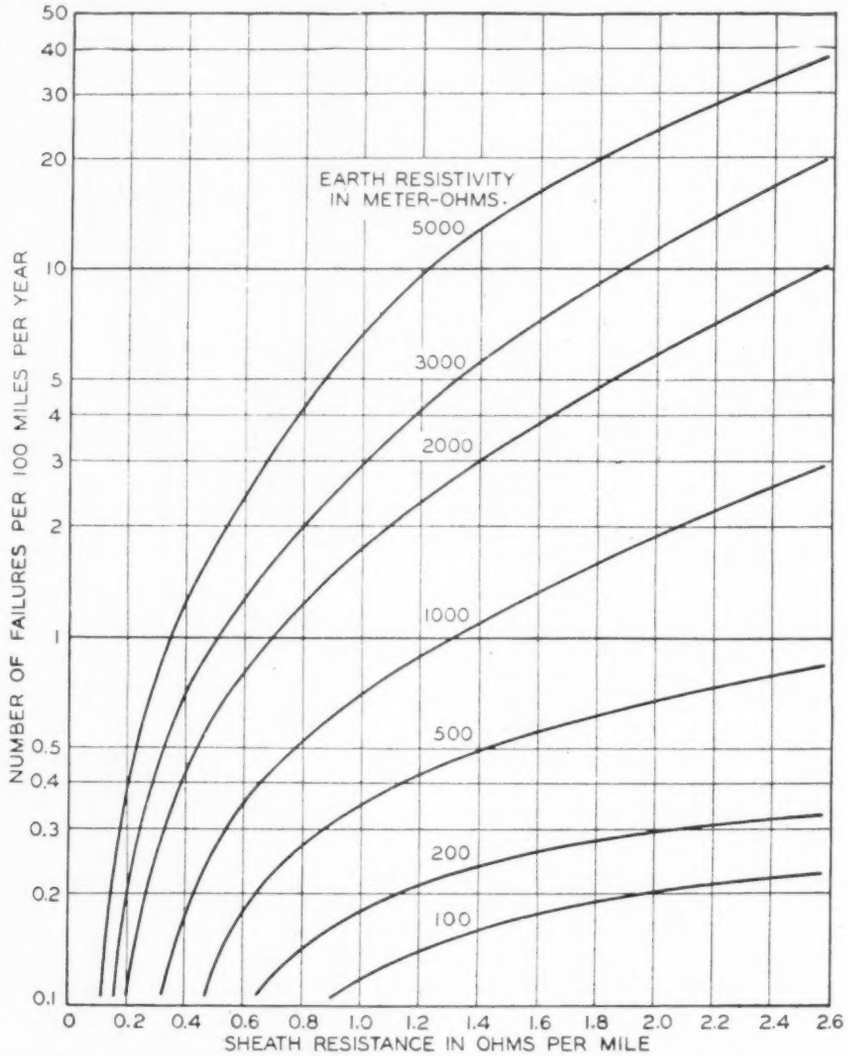

Fig. 7—Calculated expectancy of cable failures with normal insulation between core and sheath for a lightning incidence of ten thunderstorm days per year.

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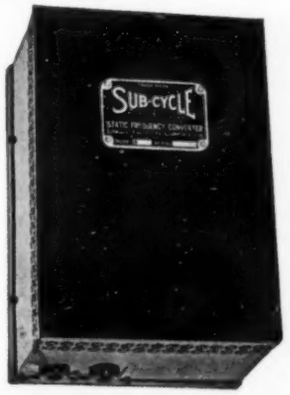

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Leich Announces Organization Changes

(Concluded from page 88)

H. P. Boswau, new vice-president in charge of engineering, has been associated with telephone manufacturing and operating companies for over 30 years. His wide experience includes extensive development work in manual and dial telephony, as well as in the field of radio telephony.

Beginning his telephone career with the physical laboratory of the Western Electric Company (now Bell Telephone Laboratories), Mr. Boswau then spent several years as development engineer with European manufacturers. Here he worked on manual and dial switchboards, intercommunicating systems, PBX's and other telephone apparatus. Upon his return to the United States, Mr. Boswau engineered dial exchanges for the Automatic Electric Company and later became acting chief engineer for the North Electric Company.

Then as chief engineer for the Lorain County Radio Corporation, Mr. Boswau worked on the design and production of what is said to be one of the world's finest radio-telephone systems, serving more than 600 cargo vessels on the Great Lakes. Mr. Boswau now holds 23 U. S. patents relating to radio and telephone apparatus and circuit control.

P. A. Hagen, the new vice-president in charge of manufacturing, came to Leich within the last few years, but his long experience in production of assembled electrical units, makes him ideally suited for his new position. Mr. Hagen previously was production manager for Bell & Howell, manufacturers of motion picture cameras and projectors. In his position with this firm, Mr. Hagen was responsible for the organization of the Electronic Manufacturing Division when the company first started to manufacture sound reproducing equipment.

Mr. Hagen has also had 10 years experience in the installation, operation and engineering of radio broadcasting studios.

◆

P. N. Coleman Gets National Chamber Post

P. N. Coleman, president of the American Cross Arm Company, has been named to membership on the department of Manufacturers Committee of the United States Chamber of Commerce.

P. N. Coleman

The appointment came from Earl O. Shreve, newly elected president of the USCC, and is recognized as a distinct honor as few men in the Southeast have been named to important posts by the organization.

The Department of Manufacturers Committee serves in a general advisory capacity upon a wide variety of important and timely matters that invite Chamber action, President Shreve advised Coleman.

Mr. Coleman's operations are national in scope, being President of American Cross-Arm Inc. with plants at Jacksonville, Philadelphia and Portland, as also President of Continental Cross-Arm Co. of Chicago.

◆

U. S. Safety Service Co. Introduces "Saf-I-Shield"

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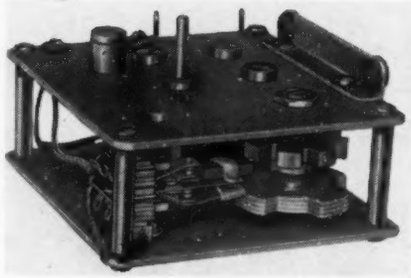
◆

New Improvements in Amglo Constant Speed D.C. Motor

An improved model of the constant speed d.c. motor which, according to the manufacturer, virtually antiquates the year-old original, has been developed by the Amglo Corporation, Chicago. The new motor is adapted to many uses here-to-fore beyond the scope of the D. C. field, particularly in industrial and commercial applications where synchronous units are required.

Approved by the Bureau of Standards, the FCC, and CAA, the new model utilizes the principle of polarized magnetic drive of a vibrating reed, the nucleus of speed control under D.C. power. This results in a powerful attraction and repulsion force which assures immediate self-starting at all times, as well as much longer periods of operation without maintenance.

The improved motor, like its predecessor, is said to be the only motor of its kind providing A.C. motor performance to the D.C. market. When tested under actual working conditions, and in numerous government and commercial laboratories, the new model maintained constant speeds regardless of wide variations in voltage. It was completely self-starting, attaining full speed almost instantly, and exhibited marked increases in operating efficiency.



Amglo constant speed D.C. motor

◆

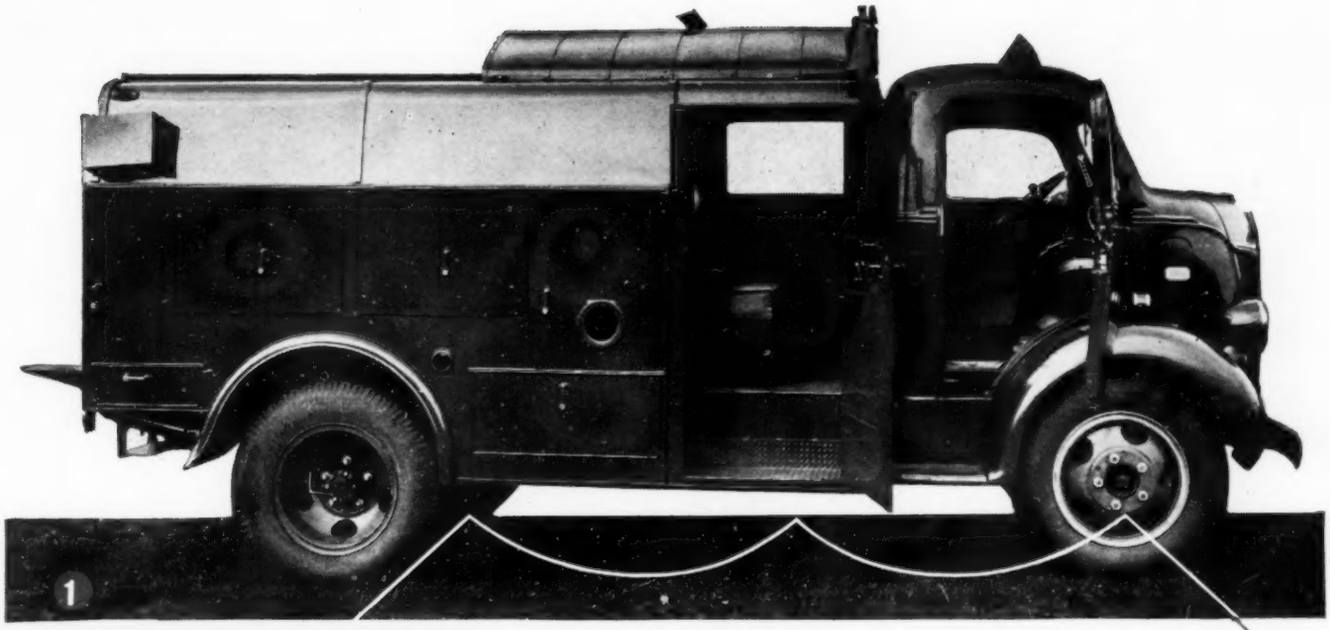
Four Wheel Drive Co. Holds Service Schools

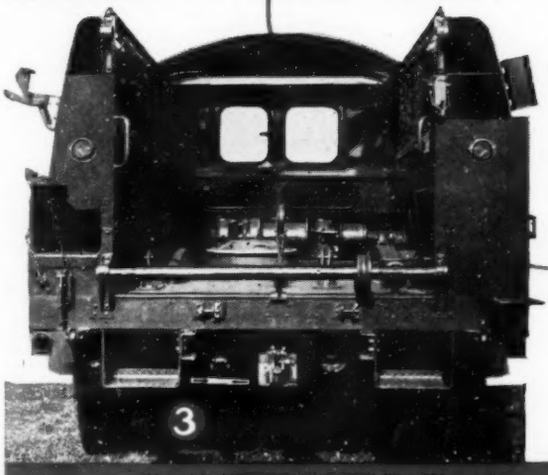
A series of dealers' service training schools instigated last year by The Four Wheel Drive Auto Company is paying off in better service to its customers' trucks, according to Lloyd Pernot, service division manager for the company.

Sixty-eight men have attended these schools to date, representing thirty-four FWD dealer organizations, Mr. Pernot said. Service men have attended the course from Canada, Mexico, Honolulu and from Chile.

The objective of the course is to

At the FWD dealer service training school, trainees completely disassemble and assemble all the mechanical units of FWD trucks.





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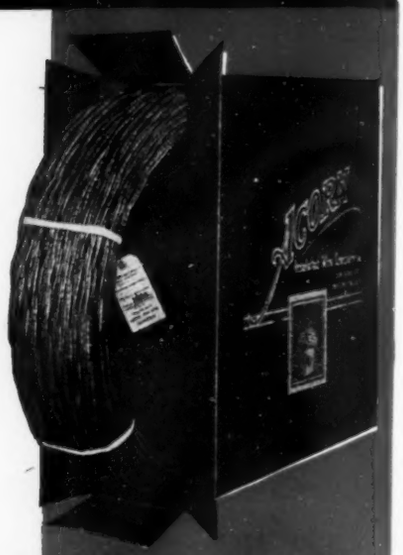

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BRIDLE
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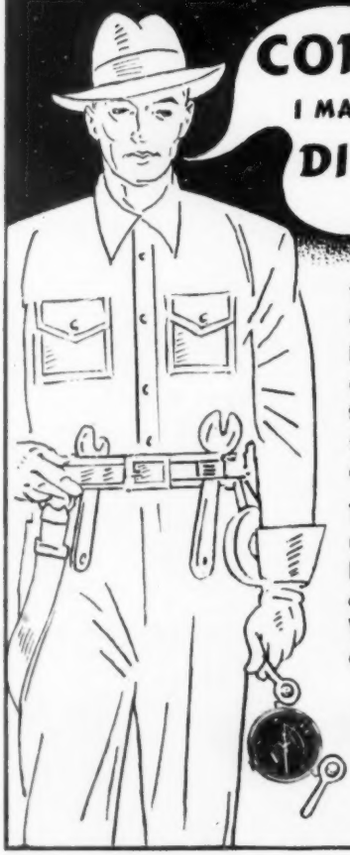
FIXTURE
PLASTIC INSULATED

ACORN INSULATED WIRE COMPANY, INC.
225 King Street, Brooklyn, N. Y.
LEICH SALES CORP., 427 W. Randolph St., Chicago
LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland

ACORN'S exclusive Carton packaging preserves carefully developed QUALITY until installed . . .

Drop Wire—Bridle—Interior—Tree—Ground—Switchboard—Pothead—Cable Terminal—Instrument—Fixture—Buried Wire

CORRECT TENSION?
I MAKE SURE OF IT WITH A RELIABLE
DILLON DYNAMOMETER



There's no guesswork—no questionable "sight and sag" when an accurate Dillon Dynamometer is on the job. Easy to use and easy to read, this compact instrument pays for itself in a short time in time and material saved. Models rated as low as 500 pounds and up to 20,000 pounds.

Thousands of Dillon Dynamometers are in use today! For guys, conductor, strand or high tensile wire. Figures are large, readings are direct in pounds. No charts, no figuring. Write today for illustrated folder listing capacities and *low* prices!

W. C. DILLON & CO. Inc.
5410 WEST HARRISON STREET
CHICAGO 44, ILLINOIS, U. S. A.

train service men employed by FWD dealers in factory approved methods of servicing FWD trucks. The men are given instructions on lubrication, adjustments, operation and the maintenance of all different FWD models. They also completely disassemble and assemble every unit of every model including motors, axles, transmissions, steering mechanism, brakes, etc. Dealers who have sent their representatives through the FWD factory for this training state that the knowledge gained by their service men has been invaluable in correctly caring for their customers' trucks. They have found that the FWD truck is gaining a wider market in their territory when they are able to offer adequate and fast service facilities.

Service training schools will be held by the company in October and in December, Mr. Pernot said. Beginning with the first of the year the department will inaugurate an advanced training course for its dealers' service men. The present course provides a fundamental basis and the 1948 "graduates" will cover servicing of new FWD truck models and new FWD developments.

◆

New, Featherweight Aluminum Ladder

The Aluminum Ladder Co., Carbis St., Worthington, Pa., announces a new featherweight model aluminum ladder, economically designed for light industrial, home and farm uses.

Designated as Model DLL, this new ladder weighs slightly over 1 lb. per ft., and is safe for a 250 lb. load. Advantages of the new ladder lie in the fact that aluminum will not rot or rust. In addition, it can be washed or scalded frequently without impairing its strength. Rungs are corrugated for safe footing. Sizes range from 6 ft. to 16 ft. lengths, and two of the 8, 10 and 12 ft. length ladders can be joined to form an extension ladder.

The manufacturer will send literature and complete information on request.

◆

Stromberg-Carlson Reports Six Months' Net of $540,000

The Stromberg-Carlson Company has netted a six-months' profit of $540,000, Dr. Ray H. Manson, president, and Edwin C. Roworth, corporate secretary, reported in a recent letter to stockholders. Company billings through June amounted to $15,668,966.

Reduction of inventories has enabled the 53-year old communications

firm to reduce its bank debt by approximately $500,000 since the first of the year and to conserve sufficient cash resources to finance increased production and the completion of new broadcasting facilities for Stations WHAM and WHFM, the letter reports.

Telephone switchboards are being turned out well above the normal rate, but special engineering for each board prevents unlimited expansion. Nevertheless it will take several years' production by the industry to meet the requirements of telephone operating companies, the report continues. The recent shipment of the first stromberg-Carlson XY dial switchboard has opened up new oportunities in the switchboard field. Deliveries of telephones, supplies, and sound equipment continue in good volume, according to the stockholder letter.

◆

Lloyd Woolard Joins A. B. Chance Co.

Lloyd C. "Red" Woolard, formerly Florida and South Georgia district manager for Locke Insulator, has joined the sales organization of the A. B. Chance Company, Centralia, Mo. Mr. Woolard will establish an office in Kansas City, Mo., and his territory will include the states of Kansas, Missouri, Nebraska, Oklahoma, and Arkansas.

Mr. Woolard has an excellent 15-year sales and service background in the industry. Earlier in his career he was local manager at Jasper, Florida, for the Florida Power Corporation. He is a native of McCook, Nebraska.

◆

Automatic Appoints Engh Staff Sales Engineer

The appointment of James S. Engh as staff sales engineer for Automatic Electric Sales Corporation was recently announced by that company.

In his new position, he will act in a technical advisory capacity in meeting the needs of the company's customers in the Independent field, with special reference to questions involving Automatic conversion projects.

Mr. Engh has been associated with companies of the Automatic Electric group since 1901, and during the greater part of his career has travelled widely among Independent operating people, among whom he has become well known and highly regarded for the engineering and operating assistance he has been able to render them

(*Please turn to page* 100)

The full length treatment protects Penta Poles from top to butt.

THERE'S A *Runzel* RECEIVER CORD FOR EVERY TYPE RECEIVER

Whatever your receiver equipment—from the old style wall type to the most modern dial desk type—there's a Runzel receiver cord that will do a better, longer-lasting job. Runzel receiver cords are offered in a choice of colors, black or brown. Special length cords can be speedily made to order.

You can rely on Runzel cords for your receiver, switchboard, desk stand, operator and hand set needs.

It's simple to order Runzel cords —by Runzel code, original manufacturer's code, or by sample cord.

RUNZEL CORD & WIRE CO.
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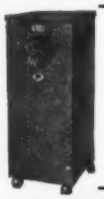
For the Convenience of readers of Telephone Engineer



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Automatically controlled, using flake calcium chloride for preventing dampness and condensation in automatic totally enclosed telephone exchanges.

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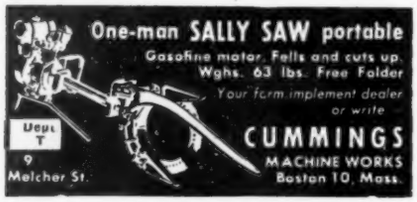
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SH	SBG	SGF	TAY	CBE	CEB
SJ	SBH	SGH	TBL	CBM	CEC
SL	SBX	SGJ	TBN	CBY	CEQ
SN	SDE	TB	TBQ	CCC	
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HELP WANTED: Position open for Plant Manager with ability and experience to take charge of group of one common battery and small North Automatic exchanges. Total stations 1300. A real position with adequate salary for a man with the know how and desire to work. Unless you are capable and ambitious don't apply. Good equipment and tools. This is your opportunity if you have what it takes. Salary will satisfy if you can qualify. Located in Texas. Box 8503, c/o Telephone Engineer & Management.

HELP WANTED: Qualified individual to fill District Manager's position. Please state age, marital status and experience in first inquiry. Excellent opportunity for right person. Southern Continental Telephone Company, Cookeville, Tennessee.

HELP WANTED: Traffic Superintendent for two-state, 54 exchange operation. Excellent opportunity for qualified individual. Please state age, marital status and experience in first inquiry. Southern Continental Telephone Company, Cookeville, Tennessee.

HELP WANTED: Equipment man qualified to maintain all types of equipment including carrier. Please state age, marital status and experience in first inquiry. Southern Continental Telephone Company, Cookeville, Tennessee.

HELP WANTED: Combination Plant Man to maintain both inside and outside plant of common battery exchange. Permanent employment and good wages. Write Oklahoma Telephone Company, Broken Arrow, Oklahoma.

HELP WANTED: 2 combination men wanted for installing telephone and clearing drop line and instrument trouble, by large Class-A Co. in Ohio. Permanent position for right men. Box No. 8516.

HELP WANTED: Lineman needed by large Ohio Independent. Good steady position. Box No. 8517.

WANTED: Representatives—qualified for "STANDARD ART CODE", good Commission. Write—Rachel Harriet Stotts, Box-371. Chariton, Iowa.

WANTED: Accountant preferably one with telephone experience to take charge of accounts for system having approximately 25,000 telephone subscribers, gross revenue approximately $1,500,000. Must be experienced. Location Southern California. Write P.O. Box 8519 c/o Telephone Engineer.

WANTED: Young graduate engineer, trained and having some experience in telephony. Location California and West Coast. Write P.O. Box 8518 c/o Telephone Engineer.

Position Wanted

COMPTROLLER-TREASURER Available: Executive with over 25 years experience in accounting, financial and administrative work in diversified fields, in United States and abroad. Vice President, Comptroller and Director of group of tele-communication companies and manager of associated business interests. Practical experience at head office and field includes wide range of activities and responsibilities. Age 49. Box No. 8521 c/o Telephone Engineer.

Wanted to Buy

WANTED: In market for used good condition Kellogg Common Battery Switchboard or Western Electric Company C. B. board. Advise what you have. Box No. 8522 c/o Telephone Engineer.

For Sale

FOR SALE: Rebuilt Common Battery Equipment. Western Electric No. 40-L Stands, Complete at $6.60 ea. No. 534A Ringer boxes, $4.50 ea. Extension Hand Set Phones, Desk or Wall, at $8.00 ea. Independent Telephone Repair Co., 1432 W. 15th St., Chicago, Illinois.

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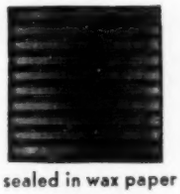

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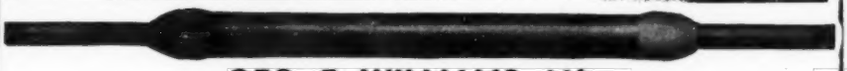

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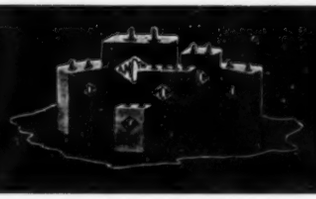

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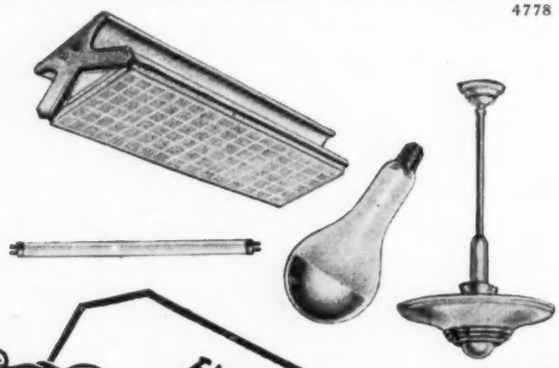

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James S. Engh

out of his extensive practical experience.

Mr. Engh was a pioneer in the installation and operation of many of the early Strowger Automatic exchanges, both in the United States and in various countries abroad. As a result of his long work in this field, which included studies of many of the largest and most important plants in the country, he was able to make significant contributions to the refinements in equipment design. He was also highly influential in the early introduction of scientific operating and maintenance practices in Automatic exchanges.

After a brief period of absence in the late 20's during which time he was engaged in the appraisal and purchase of Independent operating companies, he returned to the Automatic Electric group as sales engineer assigned to assist Independent telephone companies in connection with the manifold technical and operating problems growing out of their increasing use of Automatic Electric equipment.

During and just preceding the war he was assigned to the general supervision of the foreign operating companies of the Gary Group, until early in 1945, when he went to Colombia, S. A. as resident engineer in connection with important Strowger Automatic conversion projects in that country.

Mr. Engh's long and outstanding service among operating companies and his intimate knowledge of the practical application of Automatic equipment to their needs are expected to prove factors of steadily increasing importance in advancing the mutual welfare of the Company and its telephone company customers.

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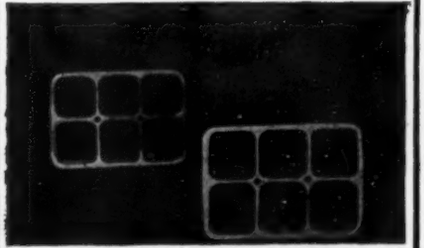

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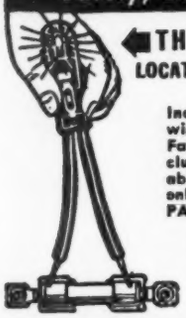

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Indicates hot or grounded wires. Tells AC from DC. Far superior to ordinary clumsy test bulb. Indispensable in shop or home. The only pocket-size tester with PATENTED SAFETY FEATURE.

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for harmonic or coded bells. Dual purpose device which economically improves both ringing and transmission on party lines. NO MOVING PARTS. Fully guaranteed. Can be installed in a minute.

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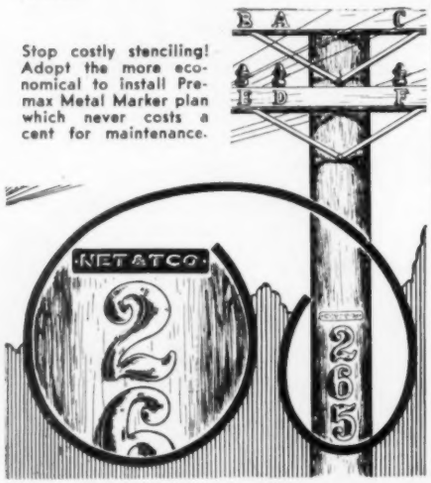
are stamped and embossed from pure aluminum and will outlast any wood pole. First cost is actually lower than stenciling—and Premax Markers are visible under all weather conditions. Send for details and prices.

Stop costly stenciling! Adopt the more economical to install Premax Metal Marker plan which never costs a cent for maintenance.



Premax Products

Division Chisholm-Ryder Co., Inc.
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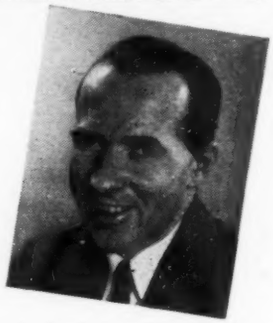
THE BACK OF THE BOOK



By JOHN G. REYNOLDS
Managing Editor

SALESMAN'S PRAYER . . .

THE DAY IS rapidly approaching, writes a reader, when telephone salesmen will come back into their own. No more will they be "order takers," but will be out beating the bushes for new subscribers, and new markets, thus keeping the manufacturers busy at their jobs to the financial betterment of us all. When that situation becomes general we'll be back to the promised land of "normalcy" and be the better for it. In view of this fact, our reader enclosed the following oldie—evidently written in the '30's but as applicable now as then:

"O, Lord in these days when Anybody can sell a telephone, help me to remember that it will not always be thus;

That Humility still is the Hallmark of the Successful Telephone Salesman.

That the Seller is always Servant to the Subscriber;

That Arrogance costs as many orders as Ignorance of the line;

That I have too short a Memory ever to tell a lie, and that Subscribers have too long a Memory ever to forget a Wrong;

Above all, help me to remember that no one ever lost an Station Order because Quality was too High, or Service too Good. Amen."

• • •

MARCONI ON A SPOT . . .

IF YOU HAD any idea that Marconi invented the radio, forget it. That was the recent advice of Alexander Fortushenko, Russian deputy minister of communications, to the International Telecommunications conference.

Fortushenko said the real inventor was a Russian named Alexander Popov who supposedly was the first to transmit a message by radio in 1895 from Moscow. That year, he added, Guglielmo Marconi, an Italian, was merely experimenting. Moscow radio recently has credited Popov with the invention.

"I don't deny the great contribution of Marconi," Fortushenko continued, "I call to your attention that the United States Supreme Court in 1942 confirmed in volume 320, pages 1731 to 1733 that radio was not first used by Marconi."

After hearing what apparently had been capitalist-suppressed revelations, Arno Huth, New York radio consultant, pointed out that Mr. Marconi himself had observed: "There is no invention of radio—radio is the result of the work of many hundreds of people."

Other delegates among the 62 nations represented at the conference chidingly referred to another recent revelation as printed in the Russian press to the effect that Edison did not invent the electric light—it was a Russian.

• • •

SOCIAL TREND ANALYST . . .

THE TELEPHONE has come of age—as a scientific medium for interpreting social trends of San Francisco. The peaks and valleys in traffic volume of calls can tell the story as graphically as a picture book.

Records have always been kept by the Pacific Telephone and Telegraph Company as an aid to scheduling personnel, but these charts can also be a gold mine for sociologists.

It is elementary, perhaps, that 24.2 per cent of all Bay Area calls asking for the time of day come in between 7 and 8 in the morning.

But why do 2300 people ask every day for the time between 4 and 5 in the afternoon—second high peak? Is it because they want to quit work on time?

Average day for all San Francisco exchanges, both automatic and manual, is 1,859,700 calls. Whether it be in a commercial or residential district, the morning peak is always between 10 and 11 o'clock, day after day, year after year.

But come a rainy day, calls through a residential office will jump 10,000, with the peak coming at the same time.

SHERRON
ACOUSTIC
STAINLESS STEEL TELEPHONE BOOTH

GLISTENING STAINLESS STEEL

It Keeps 'Em Coming!

Keep 'em coming. Regularly, day in, day out. That's the secret of pay station profits. Sherron stainless steel booths are designed to keep 'em coming . . . again and again. Bright, sparkling Sherron stainless steel booths always stay invitingly new.

MORE REASONS WHY THE SHERRON ACOUSTICS STEEL TELEPHONE BOOTH IS TOPS:

- *All-metal rigid construction*
- *Improved door hinges prevent creaking or sticking. Door operates easily and quietly in stainless steel track*
- *Automatic, noiseless door switch controls ceiling light of special design, eliminating current consumption when not in use*
- *Linoleum covered steel floor prevents wear on floor of owner's premises*
- *Adjustable shelf and instrument backboard*
- *Electric ventilating unit of improved type*
- *Steel seat of new design*
- *High grade baked enamel finishes*

SHERRON METALLIC CORPORATION

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When You Buy North Equipment You Buy Quality

In the telephone field, North is synonymous with quality—because from the first blueprint to the final product, North utilizes its many years' accumulation of technical skills, the finest of materials, and its well balanced plant facilities. We have given the telephone industry some of its finest equipment.

NORTH QUALITY In its All-Relay switchboard equipment means freedom from routine maintenance, a new low in operating expense, and a long service life.

NORTH QUALITY In its telephone instruments means sensitive ringers, bell-like transmission, beautiful lines.

NORTH QUALITY In its dial means operation under all weather conditions for a period of many years.

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